Before You Begin

AutoCAD Map 3D ObjectARX Developer's Guide describes how to use ObjectARX classes to automate and extend AutoCAD Map 3D.

AutoCAD Map 3D ObjectARX extends AutoCAD ObjectARX into the AutoCAD Map 3D domain.

The ObjectARX and ObjectARX .NET APIs each cover most of AutoCAD Map 3D functionality. But they don't cover Resource Service, Feature Service, or Mapping Service. These areas are covered by the Geospatial Platform API, which is exposed as .NET only.

Topics in this section

Sources of Information

To develop applications using AutoCAD Map 3D ObjectARX, you should be familiar with AutoCAD ObjectARX and also the AutoCAD Map 3D and AutoCAD applications.

For information about...	Refer to...
AutoCAD ObjectARX	AutoCAD ObjectARX Help, *arxdoc.chm*, which is located in the *docs* folder of AutoCAD Map 3D SDK installations.
AutoCAD Map 3D and AutoCAD	AutoCAD Map 3D Help, which is located in the *Help* folder of AutoCAD Map 3D installations.

AutodCAD Map 3D Help is especially useful for undestanding how AutoCAD Map 3D models its domain. For understanding drawing sets and queries, for example. Since detailed explanations of these paradigms are available in AutoCAD Map 3D Help, AutoCAD Map 3D SDK Help explains them only briefly or not at all. Before you attempt to automate or extend an AutoCAD Map 3D feature, be sure to review the subject in AutoCAD Map 3D Help.

Compatability of SDKs

The AutoCAD Map 3D SDK must be installed in an existing AutoCAD SDK installation, and the AutoCAD Map 3D SDK and AutoCAD SDK versions must be compatible with each other and with the version of AutoCAD Map 3D that you are extending. For example, the AutoCAD Map 3D 2008 SDK must be installed into an existing AutoCAD 2008 SDK installation, and you need both to build ObjectARX applications for AutoCAD Map 3D 2008.

Typographic Conventions

Text element	Description
bold sans serif	Text you enter at the AutoCAD Map 3D command prompt.
italic	Names of files and directories.
monospace font	Sample code.

Note Note All file names and directory paths in AutoCAD Map 3D are case sensitive.

Drawing Sets

The collection of drawings used in a particular project is the project's drawing set.

Topics in this section

- Drawing Sets Detail

Drawing Sets Detail

When you save a project, AutoCAD Map 3D automatically saves references to all the project's drawing set files in the project's DWG file.

You attach drawings to and detach drawings from a drawing set.

Attached Drawings

A drawing set is a tree of attached drawings. Any of the attached drawings can have other drawings attached to them. The drawings that are not directly attached to the root of the drawing set (at level 0 of the tree) are called nested drawings.

You can use AcMapDrawingSet functions to edit and manipulate only drawings that are directly attached to the drawing set at the root level (level 0) of the drawing set. To access and edit drawings at deeper levels, use the functions of the AcMapAttachedDrawing class.

A single drawing can be directly attached to the drawing set only once. However, a single drawing can have multiple entries in the drawing set at nested levels 1 and deeper.

You can designate an attached drawing as active or inactive. When a query is executed in the project, only the active drawings are considered. When you work with object data in a project, open drawings instead of attaching them.

Drawing Set Reactors

You can attach a reactor to a drawing set. A drawing set reactor notifies an application about drawing set-related events, such as attachment, detachment, activation, or deactivation. Whenever the drawing set is modified, an appropriate function of the reactor object is called before termination of the zero level Map transaction.

Saving Attached Drawings

If, after modifying an attached drawing, you want to save the changes in the source drawing, you must specify the set of drawing objects to be saved in a save set.

Saving an attached drawing with its drawing objects is typically a three-part procedure:

1. Lock the drawing for writing using AcMapAttachedDrawing::LockForWrite.
2. Clone the drawing objects that you wish to save using one of the AcMapAttachedDrawing class's functions.
3. Save the changes back to the drawing's source file using AcMapAttachedDrawing::Save.

For More Information

For more information about drawing sets, see the UI documentation, Autodesk Map Help.

Drawing Set Sample

Topics in this section

Drawing Set Sample

The following sample demonstrates drawing set operations.

```
void editDSet()
{

 AcMapSession *mapApi;
 AcMapProject   *pProj;
 AcMapDrawingSet *pDSet;
 char       res[32];
 do {

  mapApi = AcMapGetSession();
  if (mapApi == NULL)
  {

   acutPrintf ("\nCan't connect MAP") ;
   break ;

  }
  if (mapApi-&gt;GetProject(pProj) == Adesk::kFalse)
  {

   break ;

  }
  if (pProj-&gt;GetDrawingSet(pDSet) == Adesk::kFalse)
  {

   acutPrintf ("\nCan't get drawing set") ;
   break ;

  }
  do {

   // Setup
   printDSet(pDSet) ;
   *res = EOS ;
   acedInitGet(
   0,
   "eXit aTtach Detach Activate deaCtivate Settings
   gettaBle aLiases View Preview Report Query Zoom") ;
   if (acedGetKword(
   "\naTtach/Detach/Activate/deaCtivate/
   Settings/gettaBle/aLiases/View/Preview/Report/
   Query/Zoom/&lt;eXit&gt;: ",
   res
   ) == RTNORM)
   {
   if (*res == EOS || !(strcmp(res, "eXit")))
   {
   break ;
   }
   // Attach a drawing
   else if (!strcmp(res, "aTtach"))
   {
   if (acedGetString (
   1,
   "Enter alias path: ",
   res
   ) == RTNORM)
   {
   AcMapAttachedDrawing *pDwg = NULL ;
   if (pDSet-&gt;AttachDrawing(pDwg, res) == AcMap::kOk)
   {
   delete pDwg ;
   }
   }
   }
   // Detach a drawing
   else if (!strcmp(res, "Detach"))
   {
   acedGetString(1, "Enter drawing path ", res) ;
   AcMapAttachedDrawing *pDwg = NULL ;
   pDSet-&gt;DetachDrawing(res) ;
   }
   // Activate a drawing
   else if (!strcmp(res, "Activate"))
   {
   acedGetString(1, "Enter drawing path ", res) ;
   AcMapAttachedDrawing *pDwg = NULL ;
   if (pDSet-&gt;GetDrawing(
   pDwg,
   res,
   Adesk::kFalse
   ) == AcMap::kOk)
   {
   pDwg-&gt;Activate() ;
   delete pDwg ;
   }
   }
   // Deactivate a drawing
   else if (!strcmp(res, "deaCtivate"))
   {
   acedGetString(1, "Enter drawing path ", res) ;
   AcMapAttachedDrawing *pDwg = NULL ;
   if (pDSet-&gt;GetDrawing(
   pDwg,
   res,
   Adesk::kFalse
   ) == AcMap::kOk)
   {
   pDwg-&gt;Deactivate() ;
   delete pDwg ;
   }
   }
   // Get a drawing's symbol table
   else if (!strcmp(res, "gettaBle"))
   {
   acedGetString(1, "Enter drawing path ", res) ;
   AcMapAttachedDrawing *pDwg = NULL ;
   if (pDSet-&gt;GetDrawing(
   pDwg,
   res,
   Adesk::kFalse
   ) == AcMap::kOk)
   {
   getTable(pDwg) ;
   delete pDwg ;
   }
   }
   // Edit a drawing's settings
   else if (!strcmp(res, "Settings"))
   {
   acedGetString(1, "Enter drawing path ", res) ;
   AcMapAttachedDrawing *pDwg = NULL ;
   if (pDSet-&gt;GetDrawing(
   pDwg,
   res,
   Adesk::kFalse
   ) == AcMap::kOk)
   {
   editSettings(pDwg) ;
   delete pDwg ;
   }
   }
   // Preview all of a drawing
   else if (!strcmp(res, "View"))
   {
```

```
acedGetString(1, "Enter drawing path ", res) ;
AcMapAttachedDrawing *pDwg = NULL ;
if (pDSet-&gt;GetDrawing(
pDwg,
res,
Adesk::kFalse
) == AcMap::kOk)
{
pDwg-&gt;Preview() ;
delete pDwg ;
}
}
// Preview queried objects in a drawing
else if (!strcmp(res, "Preview"))
{
acedGetString(1, "Enter drawing path ", res) ;
AcMapAttachedDrawing *pDwg = NULL ;
if (pDSet-&gt;GetDrawing(
pDwg,
res,
Adesk::kFalse
) == AcMap::kOk)
{
AcDbObjectIdArray tIds ;
pDwg-&gt;ApplyQuery(tIds) ;
pDwg-&gt;Preview(tIds) ;
delete pDwg ;
}
}
// Create a report of the queried objects in a drawing
else if (!strcmp(res, "Report"))
{
acedGetString(1, "Enter drawing path ", res) ;
AcMapAttachedDrawing *pDwg = NULL ;
if (pDSet-&gt;GetDrawing(
pDwg,
res,
Adesk::kFalse
) == AcMap::kOk)
{
AcDbObjectIdArray tIds ;
pDwg-&gt;ApplyQuery(tIds) ;
pDwg-&gt;Report(tIds) ;
delete pDwg ;
}
}
// Copy the drawing objects matching the
// current query to the project drawing
else if (!strcmp(res, "Query"))
{
    acedGetString(1, "Enter drawing path ", res) ;
    AcMapAttachedDrawing *pDwg = NULL ;
    if (pDSet-&gt;GetDrawing(
    pDwg,
    res, Adesk::kFalse
    ) == AcMap::kOk)
    {
    AcDbObjectIdArray tIds ;
    pDwg-&gt;ApplyQuery(tIds) ;
    pDwg-&gt;QueryIn(tIds) ;
    delete pDwg ;
    }
    }
    // Zoom the drawings to the maximum
    else if (!strcmp(res, "Zoom"))
    {
    pDSet-&gt;ZoomExtents() ;
    }
    }
    else
    {
    break ;
    }
    printErrStack() ;

   } while(1) ;

  } while (0) ;

 }
```

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Queries

A query is the mechanism by which the application retrieves a subset of objects from a source drawing, or from an external database associated with a source drawing, for use in the project drawing.

Topics in this section

- Queries Detail

Queries Detail

After a query has been defined, it can be saved externally and subsequently loaded into an application, where it can be executed or modified.

The building blocks for creating a query definition are query conditions and query branches.

Query Conditions

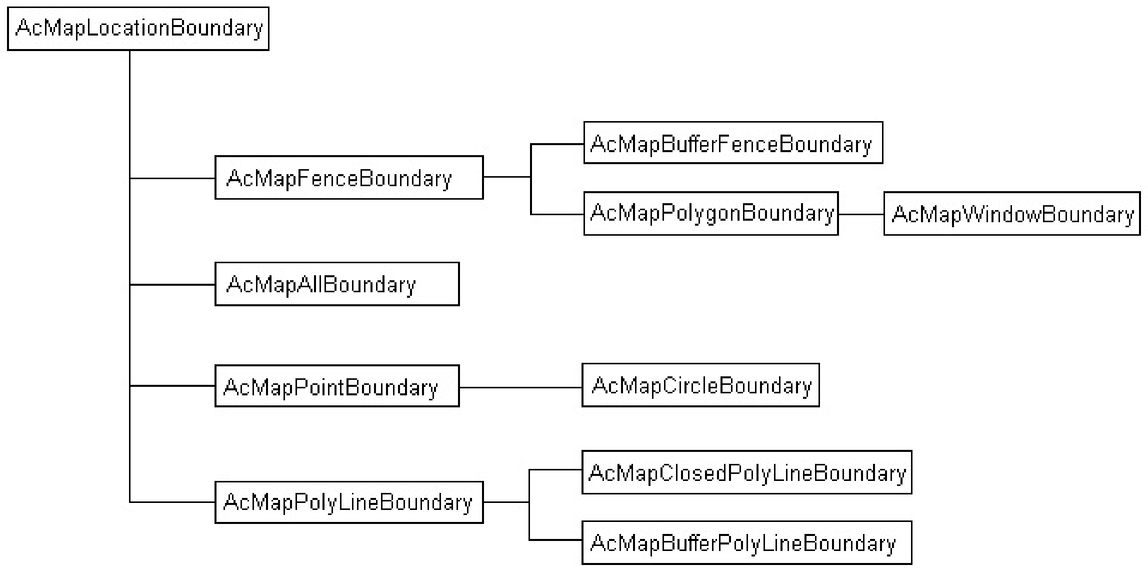
The criteria that the query uses to select objects are expressed in query conditions. There are four types of query conditions.

	Description
Location Conditions	Based on the location of objects relative to a boundary. There are several boundary types. See Location Boundaries below.
Property Conditions	Based on a particular AutoCAD property.
Data Conditions	Based on object data? information about drawing objects that is stored with drawing objects themselves.
SQL Conditions	Based on data about drawing objects that is stored in external database tables and is

specified by the
WHERE clause of a
SQL query.

Location Boundaries

There are several types of location boundaries. They are all represented by descendents of the AcMapLocationBoundary class, as illustrated in the following diagram.

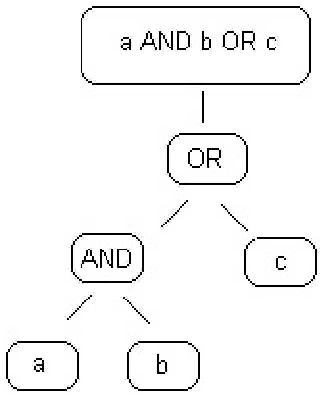


For more information about query condition types, refer to AutoCAD Map 3D Help. On the Contents tab, click Using AutoCAD Map 3D > Queries > Defining Queries.

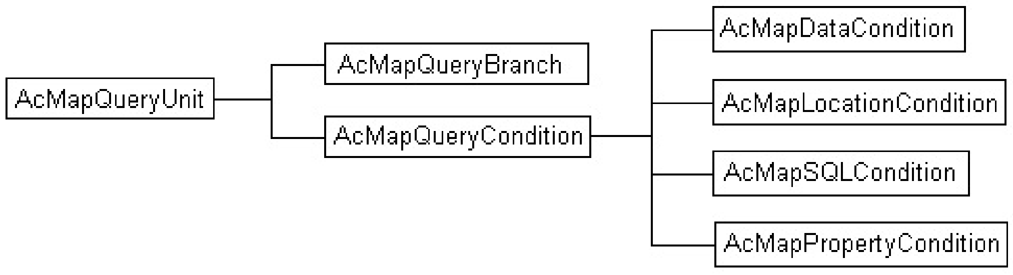
Query Branches

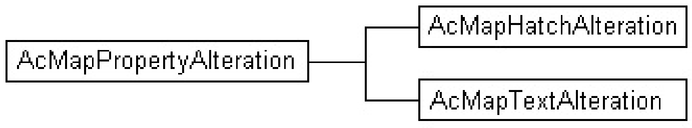
Query branches are trees composed of query conditions, possibly subordinate query branches, and join operators, which connect the components.

The following diagram illustrates the structure of a simple query branch, in which a, b, and c are query conditions and AND and OR are join operators. It expresses the query, a AND b or c.



Both query branches and query conditions inherit from the same base class, as shown in the following diagram.





To build a query

1. Create one or more query conditions (also called query units or operands).
2. Create one or more query branches.
3. Append or insert query conditions onto the branch(es).
4. Create the query definition by passing the query branch to the AcMapQuery::Define function.
5. Create the query as an object in the project using the AcMapProject::CreateQuery function. This makes the query available to

the application.

6. Save the query definition in an external file or query library.

To execute a query

1. You may want to set the mode, enable or disable property alteration, or create a report template for the query.
2. Call AcMapQuery::Run to execute the query.

For More Information

For more information about queries, see the UI documentation, AutoCAD Map 3D Help, and the Map Samples folder of ObjectARX installations.

Query Sample

The following sample demonstrates query operations.

Topics in this section

- Query Sample Code

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Query Sample Code

```
AcMapProject *pProj = NULL;
// Create a new branch object
AcMapQueryBranch *pRootBranch = NULL;
pRootBranch = new AcMapQueryBranch(AcMap::kOperatorOr);
// Create a new property condition
const char *pcValuePC = "Layer1";
AcMapPropertyCondition *pPropertyCondition = NULL;
pPropertyCondition = new AcMapPropertyCondition(
AcMap::kOperatorOr,
AcMap::kLayer,
AcMap::kCondEq,
pcValuePC
);
AcMapSession *pMapSession = NULL;
AcMapQuery *pNewQuery = NULL;
// Get the session object
pMapSession = AcMapGetSession();
if (pMapSession)
{

 // Get the currently active project
 if (pMapSession->GetProject(pProj) == AcMap::kOk)
 {

  // Create a new query object
  if ( pProj->CreateQuery(
  pNewQuery,
  Adesk::kFalse) == AcMap::kOk )
  {

   // Create a new property condition
   const char *pcValuePC = "Layer1";
   AcMapPropertyCondition *pPropertyCondition = NULL;
   pPropertyCondition = new AcMapPropertyCondition(
   AcMap::kOperatorOr,
   AcMap::kLayer,
   AcMap::kCondEq,
   pcValuePC
   );
```

```
    // Create a new branch object
    AcMapQueryBranch *pBranch = NULL;
    pBranch = new AcMapQueryBranch();
    // Append the condition to the branch
    pBranch->AppendOperand(pPropertyCondition);
    // Define the branch in the query
    if (pNewQuery->Define(pBranch) == AcMap::kOk)
    {

     // Run the query.
     pNewQuery->Run();

    }
    // Clean up
    delete pPropertyCondition;
    delete pBranch;
    delete pNewQuery;

   } // if (pProj->CreateQuery

  } // if (pMapSession->GetProject

 } // if (pMapSession)
```

Property Alteration

Property alteration does not affect corresponding objects in the source drawing or drawings (unless you deliberately save the queried objects back). The process is controlled by a set of one or more property alterations, each of which describes how a particular property of queried objects should be displayed. All the property alterations for a particular query are contained in the query's property alteration definition.

Topics in this section

Property Alteration

You associate a property alteration definition with the query that it affects using the AcMapQuery::GetPropertyAlteration function. You create a property alteration and add it to the definition, with the AcMapPropertyAlterationDefinition::AddAlteration function.

The classes used to create and manipulate property alteration for a query are

AcMapPropertyAlterationDefinition AcMapPropertyAlteration AcMapTextAlteration AcMapHatchAlteration

The last two classes, which are subclassed from AcMapPropertyAlteration, are specialized property alterations for adding text labels and hatch patterns to queried objects.

You can alter properties conditionally, depending on existing values of the property to be altered or of some other property. To do so, you will also need to use the following classes:

AcMapRangeLibrary AcMapRangeTable AcMapRangeLine

Property Types

A property alteration's type identifies the property that it alters. The properties that can be altered are enumerated in AcMap::EAlterationType. When you create a property alteration, you set its type by assigning it one of these enumerators. Note that two of these enumerators, AcMap::kAlterationTextEntity and AcMap::kAlterationHatch, create the specialized property alteration objects AcMapTextAlteration and AcMapHatchAlteration, which are subclassed from AcMapPropertyAlteration. The remaining enumerators simply identify the different kinds of AcMapPropertyAlteration objects, the simple property alterations.

AcMapTextAlteration objects in a property alteration definition create text objects when the query exceutes, which serve as text labels for queried objects. AcMapHatchAlteration objects create hatch objects, which apply hatch patterns to closed or closeable queried objects.

The value that the property acquires when the query is run is indicated by the property alteration's value expression, which you set with the AcMapPropertyAlteration::SetExpression function. For example, if the property alteration's type is AcMap::kAlterationColor, you might set its expression to "Red". If the property alteration's type is AcMap::kAlterationTextEntity, the property alteration's value expression is the text for the label. If the type is AcMap::kAlterationHatch, the value expression is a pattern name.

To define a property alteration for a query

1. Get the property alteration definition of the query using the AcMapQuery::GetPropertyAlteration function.
2. Create a property alteration and add it to the property alteration definition using the AcMapPropertyAlterationDefinition::AddPropertyAlteration function.
3. Set the property alteration's expression using the AcMapPropertyAlteration::SetExpression function.
4. Repeat steps 2 and 3 for every property alteration that you want to be executed by the query.

Applying Property Alteration

When the query is executed, property alteration is applied only if it is defined and enabled. Use the following AcMapQuery functions to determine whether property alteration has been defined for a query, whether it has been enabled, and to enable or disable it as needed.

AcMapQuery::IsPropertyAlterationDefined
AcMapQuery::IsPropertyAlterationEnabled
AcMapQuery::EnablePropertyAlteration

Property alteration is defined if the query's property alteration definition contains at least one property alteration.

Conditional Property Alteration

You can alter properties conditionally, depending on existing values of the property to be altered or of some other property. For example, you can alter the colors of queried parcels depending on their assessed value.

A range table is a collection of range lines. A range line consists of a comparative operator (such as "greater than"), a comparison value (such as 1,000,000), and a return value (such as "Green"), to express a conditional alteration such as, "If the value is greater than 1,000,000, return green." To use a range table, pass a range table expression to the property alteration's SetExpression function. A range table expression has the following format.

where Range is an invariant keyword.

All the range tables available to a project are contained in the project's range library, an instance of the AcMapRangeLibrary class. A project contains a single range library.

For More Information

For more information about property alteration and range tables, see the UI documentation, AutoCAD Map 3D Help, and the Map Samples folder of ObjectARX installations.

The property alteration feature of AutoCAD Map 3D lets you modify the appearance of objects queried into the project drawing.

Property Alteration Sample

This example shows how to create range lines and alterations.

Topics in this section

Property Alteration Sample

It also shows how to use them together with a query. It assumes there is a current project, a project drawing, and at least one active attached drawing with some drawing objects in it.

```
////////////////////////////////////////
// MAIN LOOP
//
// Clears the current query and calls
// DefineRangeLines(), TextAlt(), and
// HatchAlt().
//
////////////////////////////////////////
void doPropAlts()
{

 AcMapSession *mapSession = NULL;
 mapSession = AcMapGetSession();
 if (mapSession)
 {

  AcMapProject *pProj;
  if (mapSession-&gt;GetProject(pProj) == Adesk::kTrue)
  {

   // Get the current Query
   AcMapQuery *pCurrentQuery = NULL;
   if (pProj-&gt;CreateQuery(
   pCurrentQuery,
   Adesk::kTrue
   ) == AcMap::kOk)
   {
   // Before we start, clear the current query
   pCurrentQuery-&gt;Clear(Adesk::kTrue);
   // clean up
   delete pCurrentQuery;
   }
```

```
    }
   }
   // make the calls
   DefineRangeLines()
   TextAlt()
   HatchAlt()
  }
  ////////////////////////////////////
  // DefineRangeLines()
  //
  // Creates two range tables and
  // adds them to the range library
  //
  ////////////////////////////////////
  void DefineRangeLines()
  {
  AcMapSession *mapSession = NULL;
  try
  {

   mapSession = AcMapGetSession();
   if (mapSession)
   {

    AcMapProject *pProj;
    if (mapSession-&gt;GetProject(pProj) == Adesk::kTrue)
    {

     // Get the range library
     AcMapRangeLibrary *pRangeLib = NULL;
     if (pProj-&gt;GetRangeLibrary(pRangeLib) == Adesk::kTrue)
     {
     // Add a range table to the library
     AcMapRangeTable *pTable = NULL;
     const char *pcName = "MyTypeRangeTable";
     const char *pcDsc = "Table for types";
     if (pRangeLib-&gt;AddRangeTable(
     pTable,
     pcName,
     pcDsc
     ) = AcMap::kOk)
     {
     // Add range lines that will add text next to
     // entites that match the input criteria.
     pTable-&gt;AddRangeLine(
     AcMap::kRangeEq,
     "circle",
     "CIRCLE");
```

```
pTable-&gt;AddRangeLine(
AcMap::kRangeEq,
"polygon",
"POLYGON");
pTable-&gt;AddRangeLine(
AcMap::kRangeEq,
"polyline",
"PLINE");
pTable-&gt;AddRangeLine(
AcMap::kRangeEq,
"line",
"LINE");
pTable-&gt;AddRangeLine(
AcMap::kRangeEq,
"lwpolyline",
"LWPOLYLINE");
pTable-&gt;AddRangeLine(
AcMap::kRangeEq,
"text",
"TEXT");
pTable-&gt;AddRangeLine(
AcMap::kRangeOtherwise,
NULL,
"Unknown Type");
}
// clean up
if (NULL != pTable)
{
delete pTable;
pTable = NULL;
}
pcName = "MyHatchRangeTable";
pcDsc = "Table for hatch ranges";
if (pRangeLib-&gt;AddRangeTable(
pTable,
pcName,
pcDsc
) == AcMap::kOk)
{
// Add range lines that will add hatch patterns
// to entites that match the input criteria.
pTable-&gt;AddRangeLine(
AcMap::kRangeEq,
"circle",
"ANSI31");
pTable-&gt;AddRangeLine(
AcMap::kRangeEq,
"polygon",
"CROSS");
pTable-&gt;AddRangeLine(
     AcMap::kRangeEq,
     "polyline",
     "ANSI33");
     pTable-&gt;AddRangeLine(
     AcMap::kRangeEq,
     "lwpolyline",
     "DASH");
     pTable-&gt;AddRangeLine(
     AcMap::kRangeOtherwise,
     NULL,
     "SOLID");
     }
     // clean up
     if (NULL != pTable)
     {
     delete pTable;
     pTable = NULL;
     }
     }

    }

  }

}
catch(...)
{
// do some error handling
}
}
///////////////////////////////////////////////
// TextAlt()
//
// Creates a Text Alteration and sets the
// expression to the table, MyTypeRangeTable.
// Defines and runs a query with property
// alteration.
//
///////////////////////////////////////////////
void TextAlt()
{
AcMapSession *mapSession = NULL;
try
{

  mapSession = AcMapGetSession();
  if (mapSession)
  {

    AcMapProject *pProj;
```

```
if (mapSession-&gt;GetProject(pProj) == Adesk::kTrue)
{

 // Get the current Query
 AcMapQuery *pCurrentQuery = NULL;
 if (pProj-&gt;CreateQuery(
 pCurrentQuery,
 Adesk::kTrue
 ) == AcMap::kOk)
 {
 // Get the Property alteration object from the query
 AcMapPropertyAlterationDefinition *pPADef = NULL;
 if (pCurrentQuery-&gt;GetPropertyAlteration(
 pPADef
 ) == AcMap::kOk)
 {
 AcMapPropertyAlteration *pPropAltObj = NULL;
 // Add a Text Alteration
 if (pPADef-&gt;AddAlteration(
 pPropAltObj,
 AcMap::kAlterationTextEntity
 ) == AcMap::kOk)
 {
 // First we need to cast it
 AcMapTextAlteration *pTextAlt = NULL;
 pTextAlt = (AcMapTextAlteration*)pPropAltObj;
 // set some attributes
 pTextAlt-&gt;SetColor("Magenta");
 pTextAlt-&gt;SetJustification("MIDDLE");
 pTextAlt-&gt;SetRotation("45.0");
 pTextAlt-&gt;SetHeight("0.5");
 pTextAlt-&gt;SetExpression(
 "(Range .TYPE MyTypeRangeTable)"
 );
 }
 // clean up
 if (pPropAltObj)
 {
 delete pPropAltObj;
 pPropAltObj = NULL;
 }
 }
 // enable property alterations for the query
 pCurrentQuery-&gt;EnablePropertyAlteration(Adesk::kTrue);
 // Create a query branch Entity Type = ALL
 AcMapQueryBranch qBranch;
 AcMapPropertyCondition propCond;
 propCond.SetPropertyType(AcMap::kEntType);
 propCond.SetConditionOperator(AcMap::kCondEq);
```

```
    propCond.SetValue("*") ;
    qBranch.AppendOperand(&propCond);
    // define the query branch
    pCurrentQuery-&gt;Define(&qBranch);
    // set the query mode to draw
    pCurrentQuery-&gt;SetMode(AcMap::kQueryDraw);
    // run the query
    pCurrentQuery-&gt;Run();
    // clean up
    delete pCurrentQuery;
    }

   }

  }

 }
 catch(...)
 {
 // do some error handling
 }
 }
 ////////////////////////////////////////////////
 // HatchAlt()
 //
 // Creates a Hatch Alteration and sets the
 // expression to the table, MyHatchRangeTable.
 // Defines and runs a query with property
 // alteration.
 //
 ////////////////////////////////////////////////
 void HatchAlt()
 {
 AcMapSession *mapSession = NULL;
 try
 {

  mapSession = AcMapGetSession();
  if (mapSession)
  {

   AcMapProject *pProj;
   if (mapSession-&gt;GetProject(pProj) == Adesk::kTrue)
   {
   // Get the current Query
   AcMapQuery *pCurrentQuery = NULL;
   if (pProj-&gt;CreateQuery(
   pCurrentQuery,
   Adesk::kTrue
   ) == AcMap::kOk)
```

```
    {

     // Get the Property alteration object from the query
     AcMapPropertyAlterationDefinition *pPADef = NULL;
     if (pCurrentQuery-&gt;GetPropertyAlteration(
     pPADef
     ) == AcMap::kOk)
     {
     AcMapPropertyAlteration *pPropAltObj = NULL;
     // Now add a Hatch Alteration
     if (pPADef-&gt;AddAlteration(
     pPropAltObj,
     AcMap::kAlterationHatch
     ) == AcMap::kOk)
     {
     // First we need to cast it
     AcMapHatchAlteration *pHatchAlt = NULL;
     pHatchAlt = (AcMapHatchAlteration*)pPropAltObj;
     // set some attributes
     pHatchAlt-&gt;SetScale("2.0");
     pHatchAlt-&gt;SetColor("Yellow");
     pHatchAlt-&gt;SetRotation("45.0");
     pHatchAlt-&gt;SetExpression(
     "(Range .TYPE MyHatchRangeTable)"
     );
     }
     // clean up
     if (pPropAltObj)
     {
     delete pPropAltObj;
     pPropAltObj = NULL;
     }
     }
     // enable property alterations for the query
     pCurrentQuery-&gt;EnablePropertyAlteration(Adesk::kTrue);
     // Create a query branch Entity Type = ALL
     AcMapQueryBranch qBranch;
     AcMapPropertyCondition propCond;
     propCond.SetPropertyType(AcMap::kEntType);
     propCond.SetConditionOperator(AcMap::kCondEq);
     propCond.SetValue("*") ;
     qBranch.AppendOperand(&propCond);
     // define the query branch
     pCurrentQuery-&gt;Define(&qBranch);
     // set the query mode to draw
     pCurrentQuery-&gt;SetMode(AcMap::kQueryDraw);
     // run the query
     pCurrentQuery-&gt;Run();
     // clean up
     delete pCurrentQuery;
     }

    }

   }

  }
  catch(...)
  {
  // do some error handling
  }
  }
  // END
```

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Designing Queryable Custom Objects

If you are using AutoCAD ObjectARX to create AcDb custom objects, you must make sure that they will be retrievable using AutoCAD Map 3D queries.

Topics in this section

Designing Queryable Custom Objects Details

Observe the following guidelines:

- Subclass each custom object class from the appropriate ARX parent class, as detailed below.
- Ensure that each custom object instance in a drawing is added to the Model Space section of the drawing's Block table.

To support SQL or Data queries, the parent class doesn't matter.

To support location queries, a custom class must derive from AcDbEntity and overload the methods getGeomExtents, intersectWith, getStretchPoints, and transformBy.

To support property queries, custom class requirements depend on the properties to be queried:

Queryable Property	Class to Derive From	Methods to Overload
Area	AcDbCurve	getArea
Block Name	AcDbBlockReference	None
Elevation	Not supported.	
Object Type	AcDbEntity	None
Length	AcDbCurve	getEndParam getDistAtParam
Text Style	AcDbText	None
Text Value	AcDbText	None
Thickness	Not supported.	
Color	AcDbEntity	None
Group	AcDbEntity	None

Layer	AcDbEntity	None
Linetype	AcDbEntity	None

Note Object Type name specified via special MACRO, such as ACRX_DXF_DEFINE_MEMBERS.

Custom Object Protocol Extensions

Enables custom objects to participate in AutoCAD Map 3D operations such as Query and Save Back.

For more information, see

- Custom Object Protocol Extensions in AutoCAD Map 3D ObjectARX Reference Help.
- Custom Object PE sample code, which is located in the Map Samples\QueryPESample folder of AutoCAD Map 3D ObjectARX installations.

Data Sources

The AutoCAD Map 3D data-sources feature links information from an external database to objects in a drawing.

Data Sources

Other Information Sources

Data Sources SamplesData Sources Class

Data Sources

The AcMapDataSources class provides the following data-sources functions:

- Constructor/destructor - AcMapDataSources()/~AcMapDataSources()
- Attach data source - AttachDataSource()
- Detach data source - DetachDataSource()
- Detach all data sources - DetachAllDataSources()
- Connect data source - ConnectDataSource()
- Disconnect data source - DisconnectDataSource()
- Disconnect all data sources - DisconnectAllDataSources()
- Count attached data sources - GetAttachedDataSourcesCount()
- Count connected data sources - GetConnectedDataSourcesCount()
- Retrieve connected data sources - GetConnectedDataSources()
- Retrieve disconnected data sources - GetDisconnectedDataSources()
- Retrieve attached data sources - GetAttachedDataSources()

For data-sources source-code samples, see Data Sources Samples.

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Other Information Sources

- For more information about data sources in AutoCAD Map 3D, choose Help &gt; Autodesk Map Help &gt; Contents tab (or press F1), and then navigate to Using AutoCAD Map 3D (by feature) &gt; External Databases &gt; Attaching and Configuring Data Sources.
- For a data-sources tutorial in AutoCAD Map 3D, choose Help > Tutorials > Contents tab, and then choose "Working with External Databases".

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Data Sources Samples

To view code samples of data-sources functions, open the Samples folder in your AutoCAD Map 3D ObjectARX installation and navigate to Map Samples\DataSource.

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Data Sources Class

To view the data-sources class, click the following links:

AcMapDataSources Class

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Object Data

Object data is non-graphical information about an object in a drawing.

When you want to add such data to a drawing or drawing object, you create an object data table to store the data.

A single object data table contains records of a similar structure, which is defined by the object data table's table definition. The individual records in an object data table may be associated with different drawing objects. The association between the data and the object is at the level of the individual record, not at the table level.

The classes used to create and manipulate object data tables are

AcMapODColumnDefinition AcMapODContainer AcMapODRecordIterator AcMapODTable AcMapODTableDefinition AcMapODTableRecord AcMapValue

For More Information

For more information about object data, see the UI documentation, Autodesk Map Help, and the Map Samples folder of ObjectARX installations.

Object Data Samples

Topics in this section

Creating an Object Data Table

The following sample creates an object data table called Zones with two columns, Residential and Commercial.

To create an object data table

1. Include the necessary header files:

   ```
   #include "StdAfx.h"
   #include "StdArx.h"
   #include &lt;MapODColumn.h&gt;
   #include &lt;MapArxApi.h&gt;
   #include &lt;MapODDefinition.h&gt;
   #include &lt;MapProj.h&gt;
   ```

2. Create variables for the session, project, object data container, table, and columns. For example, create variables for a table with two columns.

   ```
   AcMapSession *mapApi;
   AcMapProject *pProj;
   AcMapODContainer *pODCont;
   AcMapODTableDefinition *pTabDef = NULL;
   AcMapODColumnDefinition *pColDef1 = NULL;
   AcMapODColumnDefinition *pColDef2 = NULL;
   ```

3. Create an AutoCAD Map 3D session and get the top level objects.

   ```
   mapApi = AcMapGetSession();
   mapApi-&gt;GetProject(pProj);
   pProj-&gt;GetODContainer(pODCont);
   ```

4. Allocate memory for table and column objects by calling the table and

column constructors with the new operator.

```
pTabDef = new AcMapODTableDefinition();
pColDef1 = new AcMapODColumnDefinition();
pColDef2 = new AcMapODColumnDefinition();
```

5. For each of the columns, set the column name and description and the type of data the column stores. Set the default value for the data.

```
pColDef1-&gt;SetName("Residential");
pColDef1-&gt;SetDescription("Residential R1-R3");
pColDef1-&gt;SetType(AcMap::kCharacter);
pColDef1-&gt;SetDefaultValue("R1");
pColDef2 = new AcMapODColumnDefinition();
pColDef2-&gt;SetName("Commercial");
pColDef2-&gt;SetDescription("Commercial C1-C3");
pColDef2-&gt;SetType(AcMap::kCharacter);
pColDef2-&gt;SetDefaultValue("C1");
```

6. Add the column definitions to the table definition.

```
pTabDef-&gt;AddColumn(*pColDef1);
pTabDef-&gt;AddColumn(*pColDef2);
```

7. Create the object data table. For example, create a table called Zones to store XData using the following code:

```
pODCont-&gt;CreateODTable("Zones", *pTabDef, "Zoning of Kin
Adesk::kTrue);
```

8. Release the memory you allocated for the table and columns in step 4 using the delete operator.

```
if (pColDef2) delete pColDef2;
if (pColDef1) delete pColDef1;
if (pTabDef) delete pTabDef;
```

Attaching Object Data

The following sample attaches object data to selected objects in a drawing.

It creates a record for each of the objects and adds the data from an existing table to the records. Open rather than attach the drawing that contains the objects.

To attach object data

1. Include the necessary header files:

```
#include "StdAfx.h"
#include "StdArx.h"
#include &lt;MapArxApi.h&gt;
#include &lt;MapProj.h&gt;
#include &lt;MapODRecord.h&gt;
#include &lt;MapODTable.h&gt;
```

2. Declare variables.

```
ads_name ss, ename;
long sslen, sscur;
AcDbObjectId eId;
AcMapSession *mapApi = NULL;
AcMapProject *pProj = NULL;
AcMapODContainer *pODCont = NULL;
AcMapODTable *pODTable = NULL;
```

3. Create an AutoCAD Map 3D session and get the top level objects.

```
mapApi = AcMapGetSession();
mapApi-&gt;GetProject(pProj);
pProj-&gt;GetODContainer(pODCont);
```

4. Get the table containing the data to attach.

```
pODCont-&gt;GetODTable(pODTable, "Zones");
```

5. Use ADS functions to prompt user to select the objects to which to attach the data, and process the selections.

```
acutPrintf("\nAttach data to which object(s)?");
if (acedSSGet(NULL, NULL, NULL, NULL, ss) != RTNORM) {

 acutPrintf("\nNo objects selected.\n");
 acedSSFree(ss);
 return;
}
```

6. Use an ADS function to determine the number of objects selected in step 5.

```
acedSSLength(ss, &sslen);
```

7. Loop through the objects selected in step 5, getting the entity name of the next object, and converting it to an object ID, which you pass to AcMapODTable::AddRecord. Within the for loop, you create the AcMapODTableRecord using the new operator, thereby allocating memory for each record added. Remember to delete each pointer to AcMapODTableRecord within the loop, as shown here.

```
for (sscur = 0; sscur &lt; sslen; sscur++)
{

 acedSSName(ss, sscur, ename);
 acdbGetObjectId(eId, ename);
 AcMapODTableRecord *pTabRec = NULL;
 pTabRec = new AcMapODTableRecord();
 pODTable-&gt;AddRecord(*pTabRec, eId);
 acutPrintf ("\nOD Record added to object.");
 if (pTabRec) delete pTabRec;
}
```

8. Delete the memory allocated by calling AcMapODContainer::GetODTable in step 4, and free the memory allocated for the selection set in step 5.

```
delete pODTable;
acedSSFree(ss);
```

Traversing Object Data

The following sample iterates all of an object's records using AcMapODContainer::GetObjectODRecordIterator.

You can also iterate only those records that are contained in a specified table using AcMapODTable::GetObjectODRecordIterator.

To traverse records

1. Include the necessary header files:

   ```
   #include "StdAfx.h"
   #include "StdArx.h"
   #include &lt;MapArxApi.h&gt;
   #include &lt;MapProj.h&gt;
   #include &lt;MapODIterator.h&gt;
   ```

2. Declare variables.

   ```
   int retCode = FALSE;
   ads_name ename;
   ads_point spt;
   AcDbObjectId eId;
   int recQuantity = 0;
   AcMapSession *mapApi = NULL;
   AcMapProject *pProj = NULL;
   AcMapODContainer *pODCont = NULL;
   AcMapODRecordIterator *pIter = NULL;
   ```

3. Create an AutoCAD Map 3D session and get the top level objects.

   ```
   mapApi = AcMapGetSession();
   mapApi-&gt;GetProject(pProj);
   ```

```
pProj-&gt;GetODContainer(pODCont);
```

4. Use ADS functions to prompt user to select an object, and convert the entity name of the selected object to an object ID for initializing the iterator in the next step.

```
retCode = acedEntSel(NULL, ename, spt);
if (retCode != RTNORM) {

 acutPrintf("\nNo object selected.\n");
 return;}

acdbGetObjectId(eId, ename);
```

5. Get a record iterator and initialize it for reading.

```
pODCont-&gt;GetObjectODRecordIterator (pIter);
pIter-&gt;Init (eId, AcMap::kOpenForRead, Adesk::kFalse);
```

6. Use the record iterator to count records attached to the object. Print the results.

```
recQuantity = pIter-&gt;CountRecords();
acutPrintf("\nObject has %d records attached.", recQuantity
```

7. Delete the iterator when you're finished with it.

```
if (pIter) delete pIter;
```

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Adding or Changing Object Data

The structure for containing data in an object data table is a table record (AcMapOdTableRecord object).

The actual data in the record is contained in instances of the AcMapValue class, one value for each field (column) in the record. You read the value of a record using one form of AcMapODTableRecord::Value, and you add new data or modify the existing value, using the other form, which is the non-const override of the function.

The following sample shows how to add new data or modify the current data in the object records of selected objects. Before performing this procedure, create a table named Zones. Next, attach data. Data attached to selected objects consists of two columns: a zoning code column called Code and an Approved By column.

To add or change object data

1. Include the necessary header files:

   ```
   #include "StdAfx.h"
   #include "StdArx.h"
   #include &lt;MapODColumn.h&gt;
   #include &lt;MapArxApi.h&gt;
   #include &lt;MapODDefinition.h&gt;
   #include &lt;MapProj.h&gt;
   #include &lt;MapODRecord.h&gt;
   #include &lt;MapODIterator.h&gt;
   ```

2. Define a constant for input of the record values and declare variables.

   ```
   #define USR_STRG_LENGTH 133
   int retCode = FALSE;
   ads_name ename;
   ```

```
ads_point spt;
char zoneCode [USR_STRG_LENGTH] = "";
char approveCode [USR_STRG_LENGTH] = "";
AcMapSession *mapApi = NULL;
AcMapProject *pProj = NULL;
AcMapODContainer *pODCont = NULL;
AcMapODRecordIterator *pIter = NULL;
AcDbObjectId eId;
AcMapODTableRecord record;
```

3. Create an AutoCAD Map 3D session and get the top level objects.

```
mapApi = AcMapGetSession();
mapApi-&gt;GetProject(pProj);
pProj-&gt;GetODContainer(pODCont);
```

4. Use ADS functions to prompt user to select an object, and convert the entity name of the selected object to an object ID for initializing the iterator in the next step.

```
retCode = acedEntSel(NULL, ename, spt);
if (retCode != RTNORM) {

 acutPrintf("\nNo object selected.\n");
 return;}

acdbGetObjectId(eId, ename);
```

5. Get a record iterator and initialize it for writing. Using the iterator in a for loop, traverse the records of the object selected in step 4, getting the table associated with each record.

```
pODCont-&gt;GetObjectODRecordIterator (pIter);
pIter-&gt;Init (eId, AcMap::kOpenForWrite, Adesk::kFalse);
for (; pIter-&gt;IsDone() == Adesk::kFalse; pIter-&gt;Next(
{

 pIter-&gt;GetRecord (record);
 pODCont-&gt;GetODTable (pTable, record.ODTableName());
 acutPrintf("\n*** OD Table %s.", record.ODTableName());
```

6. Loop through the columns of each record, and print the name of the column, which in this example is either Code or Approved By.

```
for (int i = 0; i &lt; record.Count(); i++)
{

  AcMapODTableDefinition tableDef = pTable-&gt;Definition();
  AcMapODColumnDefinition Column;
  tableDef.GetColumn(Column, i);
  acutPrintf("\n%-15s", Column.Name());
```

7. Print the value at the column of the record and get a pointer, colname, to the column.

```
AcMapValue &val = record.Value(i);
acutPrintf(" %s", ((const char *)val));
colname = Column.Name();
```

8. Create an AcMapValue variable and assign the value entered by the user to it. Then, assign the AcMapValue variable to the value of the record using the AcMapODTableRecord::Value function. Update the record using the record iterator.

```
if(!strcmp(colname, "Code")){

 acedGetString(TRUE,"\nNew zoning code:", zoneCode);
 AcMapValue v = zoneCode;
 record.Value(i) = v;
 pIter-&gt;UpdateRecord(record);
}
```

9. Using the same paradigm as step 9, get and update the record's Approved by column.

```
if(!strcmp(colname, "Approved")){

  acedGetString(TRUE,"\nApproved by:", approveCode);
```

```
   AcMapValue v = approveCode;
   record.Value(i) = v;
   pIter-&gt;UpdateRecord(record);

  }
```

10. End the for loop started in step 7 and delete the pointer to the table created with AcMapODContainer::GetODTable. End the for loop started in step 6 and delete the iterator created in step 5.

```



   }//end for

  if (pTable) delete pTable;
  } //end for
  if (pIter) delete pIter;
```

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Coordinate Systems

The AutoCAD Map 3D coordinate-systems functions measure geodetic distance and transform entities to a specified coordinate system.

Topics in this section

Coordinate Systems Details

Coordinate-Systems Functions

The following coordinate-systems functions are available:

- Measure the geodetic distance between two points - ade_projwsgeodistance()
- Transform an entity from the source to the destination coordinate system - ade_projentityforward()
- Transform an entity from the destination to the source coordinate system - ade_projentitybackward()

For coordinate-systems source-code samples, see Coordinate Systems Samples.

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Other Information Sources

- For more information about coordinate systems in AutoCAD Map 3D, choose Help &gt; Autodesk Map Help &gt; Contents tab (or press F1), and then navigate to Using AutoCAD Map 3D (by feature) &gt; Coordinate Systems.
- For a coordinate-systems tutorial in AutoCAD Map 3D, choose Help &gt; Tutorials &gt; Contents tab, and then choose "Working with Coordinate Systems".

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Coordinate Systems Samples

To view code samples of coordinate-systems functions, open the Samples folder in your AutoCAD Map 3D ObjectARX installation and navigate to Map Samples\CoordinateSystem.

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Coordinate Systems Globals

To view the coordinate-systems globals, click the following links:

ade_projwsgeodistance() Global Functionade_projentityforward() Global Functionade_projentitybackward() Global Function

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Converting Coordinates

Converting coordinates from one geo-referenced coordinate system to another.

Topics in this section

Converting Coordinates

Any Cartesian coordinate pair you select in a geo-referenced coordinate system corresponds to a point on the surface of the earth. This fact defines a relation between the coordinate pairs in one coordinate system and the coordinate pairs in any other, so long as the point in question actually exists in both systems. In other words, so long as the coordinate systems have a region of intersection, and the point in question is in it.

To convert the coordinates of a point from one geo-referenced coordinate system to another

1. Define a "source" coordinate system with ade_projsetsrc.
2. Define a "destination" coordinate system with ade_projsetdest.
3. Pass a coordinate pair to ade_projptforward.

   The function assumes that the coordinate pair you pass to it is a point in the source system, and it returns the corresponding coordinate pair in the destination system. If there is no corresponding coordinate pair, it returns nil.

To convert in the other direction, use ade_projptbackward.

You can specify coordinate triplets, but if you do, the Z value is ignored.

The following sample converts a known position from Latitude Longitude (LL) to Universal Transverse Mercator (UTM) using ade_projptforward(). If the conversion is successful, information about the conversion is displayed and the UTM coordinate is converted back to Lat Long using ade_projptbackward(). If you don't know the specific coordinate system code, click Select Coordinate System. In the Select Global Coordinate System dialog box, which is located under the Map ->Tools->Assign Global Coordinate System menu option. Select a category, and then select from a list of available coordinate systems. Click Properties to view the Code value of the selected coordinate system.

```
char* pszSourceCoordSys = "LL84";
int resultCode = ade_projsetsrc(pszSourceCoordSys);
char* pszDestCoordSys = "UTM27-15";
resultCode = ade_projsetdest(pszDestCoordSys);
ads_point coordPairToConvert;
coordPairToConvert[0] = -90.4794;
coordPairToConvert[1] = 38.7503;
ads_point convertedCoordPair;
resultCode = ade_projptforward(
coordPairToConvert,
convertedCoordPair);
if (RTNORM == resultCode){

 acutPrintf(
 "\nThe %s coordinate value of: %.4lf\,%.4lf was successfully conv
 " to %s yielding the value of: %.4lf\,%.4lf"
 , pszSourceCoordSys, coordPairToConvert[0], coordPairToConvert[1
 , pszDestCoordSys, convertedCoordPair[0], convertedCoordPair[1])
 coordPairToConvert[0] = convertedCoordPair[0];
 coordPairToConvert[1] = convertedCoordPair[1];
 ads_point convertedBackCoordPair;
 resultCode = ade_projptbackward(
 coordPairToConvert,
 convertedBackCoordPair);
 acutPrintf(
 "\n\n\nUsing ade_projptbackward(), the %s coordinate value of: %
 " successfully converted back to %s yielding the value of: %.4lf
 , pszDestCoordSys, coordPairToConvert[0], coordPairToConvert[1]
 , pszSourceCoordSys, convertedBackCoordPair[0], convertedBackCoo
}
else {

 acutPrintf(
 "\nNo coordinate conversion took place.");
}
```

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Feature Classification

Use AutoCAD Map 3D's feature-classification feature to create standard objects in drawings.

Topics in this section

Feature Classification Detail

Each standard object, called a *feature*, has a set of user-defined properties and data, called a *feature class*. All feature class definitions are stored in a *feature-definition file*, or *schema*. After setting up feature class definitions, you can use them to create objects with a standard set of properties and data. You can change property values, or the properties themselves, programmatically. An organization that creates road maps, for example, might have standard Primary Road and Secondary Road polyline objects in which the Primary Road features are created with thick lineweight on the Primary Roads layer, and Secondary Road features appear with thin lineweight on the Secondary Roads layer. Each road feature has associated object data, such as speed limit, number of lanes, and surface type. See also Other Information Sources.

Creating and Managing Schemas

Before you can Creating and Managing Feature Class Definitions, you must create a schema and attach it to the current drawing by using AcMapClassificationManager functions. However, before you create a new feature-definition file with CreateFeatureDefinitionFile(), use CanCurrentUserAlterSchema() to check whether the current user has sufficient privileges to create or change a schema. (Even though you don't check this first, CreateFeatureDefinitionFile() will catch an insufficient-privileges error.)

Alternatively, rather than creating a new schema, use the currently attached schema, indicated by GetFeatureDefinitionFileAttached(), or attach an existing schema with AttachFeatureDefinitionFile(). You can detach a schema explicitly with DetachCurrentFeatureDefinitionFile().

After creating or modifying a feature class definition in a schema, save the file withSaveCurrentFeatureDefinitionFile()or save a copy withSaveCurrentFeatureDefinitionFileAs(). You also can refresh the current schema withReloadCurrentFeatureDefinitionFile(), but doing so is risky because it might reload outdated data, depending on the user's actions.

For feature-classification source-code samples, seeFeature Classification Samples.

```
// Creates a new feature-definition file.
AcMapObjClass::EErrCode errCode;
const char* pszSchemaFileName = "mySchema.xml";
// Check whether current user can create or change schema.
if (CanCurrentUserAlterSchema())
{

 // Create the schema file.
 errCode = CreateFeatureDefinitionFile(pszSchemaFileName);
 // Handle errors.
 switch (errCode)
 {

  case AcMapObjClass::eNoUserPrivilegeToAlterSchema:
  // Insufficient-privileges error.
  break;
  case AcMapObjClass::eFileAlreadyExists:
  // Schema file already exists (and will be attached).
  break;
  case AcMapObjClass::eFileNameInvalid:
  // Invalid file name.
  break;
  case AcMapObjClass::eFailed:
  // Failed for some other reason.
  break;
  default:
  break;

 }
 // Attach the schema file.
 errCode = AttachFeatureDefinitionFile(pszSchemaFileName);
 if (errCode == AcMapObjClass::eOk)
 {

  ...

 }

}
```

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Creating and Managing Feature Class Definitions

After you attach a feature-definition file to the current drawing, you can define feature classes by using AcMapClassificationManager functions.

It's prudent to run a few safety checks before you create a feature class definition. For example, you could do the following:

- Use GetFeatureClassDefinitionCount() to indicate whether any existing feature classes are defined in the current schema and use GetFeatureClassNames() to list their names.
- Use IsFeatureClassDefinitionPresent() to determine whether a specific class definition exists.

Create a feature class definition by using CreateFeatureClassDefinition() (twoforms). Alternatively, you can use DuplicateFeatureClassDefinition()to copy an existing feature class definition and thenchange its attributesby using GetFeatureClassDefinition().

After creating or modifying a feature class definition in a schema, save your changes withSaveCurrentFeatureDefinitionFile()orSaveCurrentFeatureDefinitionFileAs().

To rename or delete a feature class definition, useRenameFeatureClassDefinition()orDeleteFeatureClassDefinition().

For feature-classification source-code samples, seeFeature Classification Samples.

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Classifying Entities

After you create feature class definitions, you can use them to classify the entities in the current drawing by using AcMapClassificationManager functions.

Use any of the following methods to check entities:

- To avoid redoing or overwriting previous classifications, check which entities already are classified and with which feature class definitions. GetClassifiedEntities() (two forms) lists all classified entities in the current drawing, and GetUnclassifiedEntities() lists the unclassified ones.
- Use GetUndefinedEntities() to list entities that are classified but whose feature class definitions are not in the attached feature-definition file.
- Use IsClassified() to determine whether a specific entity is classified.

Use any of the following methods to manage classified entities:

- To classify one or more entities, use Classify() (two forms).
- To inspect an entity's properties, use GetProperties() (two forms).
- To determine how an entity should be classified (or reclassified), use GetClassifiedProperties() (two forms).
- To fix out-of-range or missing values of classified properties, use Audit() (two forms).
- If an entity was classified multiple times by using different feature-definition files, use GetAllTags() to retrieve all the entity's feature class names and corresponding feature-definition files.
- To unclassify one or more entities, use Unclassify() (two forms) or ClearAllTags() (two forms).

For feature-classification source-code samples, seeFeature Classification Samples.

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Managing Attributes of Feature Class Definitions

Use AcMapObjClassDefinition functions to manage the attributes of a feature class definition stored in the feature-definition file attached to the current drawing. You can retrieve and (in some cases) set the following attributes:

- Name - GetName()/SetName()
- Description -GetDescription()/SetDescription()
- Icon -GetIconName()/SetIconName()
- Visibility -IsVisibleInWorkspace()/SetVisibleInWorkspace()
- Feature definition file -GetFeatureDefinitionFile()
- Supported entity types - GetSupportedEntityTypes() (two forms)

```
 // Print the name of this feature class definition and the
 // pathname of the feature-definition file that it belongs to.
 const char* pszFeatureClassDefinitionName = GetName();
 const char* pszFeatureDefinitionFile = GetFeatureDefinitionFile();
 acutPrintf("\nThe feature class definition name is %s", pszFeature
 acutPrintf("\nThe feature-definition file pathname is %s", pszFeat
```

Use the following functions to determine where a specific feature class exists in the feature-class hierarchy:GetDirectBaseClassName(),IsBaseClassOf(),IsBaseClassOnly(),IsDeri and IsDirectBaseClassOf().

```
// Determine whether this feature class definition is a base class
// of the feature class "Parcels".
AcMapObjClass::EErrCode errCode;
bool bBaseClassOf; // Output.
errCode = IsBaseClassOf(&bBaseClassOf, "Parcels");
if (errCode == AcMapObjClass::eOk)
{
if (bBaseClassOf == true)
{
...
}
}
```

Use GetProperty() or GetProperties() to retrieve a specific property, or all properties, of a feature class definition. GetProperties() retrieves only properties that are classified, which you can determine with IsPropertyClassified(). You can add or delete a property with AddProperty() or DeleteProperty(). To change a property's attributes, see Managing Properties.

```
// Retrieve the Linetype property.
AcMapObjClass::EErrCode errCode;
AcMapObjClassProperty* pProperty = NULL;
AcMapStringArray aStrParentToSubCategoryNames;
aStrParentToSubCategoryNames.Append("General");
const char* pszPropertyName="Linetype";
errCode = GetProperty(pProperty, aStrParentToSubCategoryNames, psz
if (errCode == AcMapObjClass::eOk)
{
// Process the property.
}
```

For digitizing data, use SetCreateMethod() (twoforms),GetCreateMethod(), and GetCreateMethodName()to set or retrieve the AutoCAD entity type that a feature class definition uses when a digitize process runs.

For feature-classification source-code samples, seeFeature Classification Samples.

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Managing Properties

Use AcMapObjClassProperty functions to manage a property for a feature class definition. You can retrieve and (in some cases) set the following attributes of a property:

- Name - GetName()
- Direct category - GetCategory()
- Type - GetType()
- Default value -GetDefaultValue()/SetDefaultValue
- Range -GetRange()/SetRange()/IsInRange()

- Visibility -IsVisible()/SetVisible()
- Read-only -IsReadOnly()/SetReadOnly()
- String representation -FromString()/ToString()

For feature-classification source-code samples, seeFeature Classification Samples.

```
// Set the range of the Length property.
AcMapObjClass::EErrCode errCode;
AcMapObjClassProperty* pProperty = NULL;
AcMapStringArray aStrParentToSubCategoryNames;
aStrParentToSubCategoryNames.Append("Geometry");
const char* pszPropertyName = "Length";
errCode = GetProperty(pProperty, aStrParentToSubCategoryNames, psz
if (errCode == AcMapObjClass::eOk)
{

 errCode = pProperty->SetRange("0.0,1.0,2.0,3.0");
 if (errCode == AcMapObjClass::eOk)
 {

  ...

 }

}
```

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Using Reactors with Feature Class Definition Events

The AcMapObjClassReactorclass provides callback functions that notify an application immediately of feature class definition events. You use this mechanism to monitor or control feature class definition operations by registering reactor instances. Functions are invoked automatically depending on the operation's type, as described in the following table:

Function	Invoked when a
FeatureClassDefinitionCreated()	Feature class definition is created

FeatureClassDefinitionDeleted()	Feature class definition is deleted
FeatureClassDefinitionModified()	Feature class definition is modified
FeatureClassDefinitionRenamed()	Feature class definition is renamed
FeatureDefinitionFileAttached()	Feature-definition file is attached to or detached from the current drawing
FeatureDefinitionFileModified()	Feature-definition file is modified and saved

Use AcMapObjClassSystem to register and unregister classification reactors with AddObjClassReactor() and RemoveObjClassReactor(). To use a reactor, perform the following steps, as shown in the sample code that follows:

1. Derive a custom class from AcMapObjClassReactor.
2. Implement events by overriding the virtual functions that you need.
3. Create an instance of the custom reactor.
4. Register the instance so that it becomes active.
5. Write some classification reactor code.
6. Remove the reactor from the list and delete it.

For feature-classification source-code samples, seeFeature Classification Samples.

```
// Derive a custom class from AcMapObjClassReactor.
class AcMapObjClassMyReactor : public AcMapObjClassReactor
{

  // Override virtual functions for the desired events.

};
// Create an instance of the custom reactor.
AcMapObjClassMyReactor* pMyReactor = new AcMapObjClassMyReactor;
```

```
// Register the custom reactor.
AcMapObjClassSystem().AddObjClassReactor(pMyReactor);
// Insert classification reactor code here.
// Remove the reactor and delete it.
AcMapObjClassSystem().RemoveObjClassReactor(pMyReactor);
delete pMyReactor;
```

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Handling Errors

Many functions in the various feature-classification classes return an AcMapObjClass::EErrCode error code. When a particular function returns an error code, read that function's documentation for function-specific error conditions rather than relying on only the generic error descriptions in the AcMapObjClass::EErrCode documentation.

Other Information Sources

- For more information about feature classification in AutoCAD Map 3D, choose Help &gt; AutoCAD Map 3D Help &gt; Contents tab (or press F1), and then navigate to Using AutoCAD Map 3D (by feature) &gt; Feature Classification.
- For a feature-classification tutorial in AutoCAD Map 3D, choose Help &gt; Tutorials &gt; Contents tab, and then choose "Using Feature Classification".

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Feature Classification Samples

To view code samples of classification functions, open the Samples folder in your AutoCAD Map 3D ObjectARX installation and navigate to Map Samples\Classification.

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Feature Classification Classes and Namespaces

To view the feature-classification classes and namespaces, click the following links:

AcMapClassificationManager Class

AcMapObjClass Namespace

AcMapObjClassDefinition Class

AcMapObjClassProperty Class

AcMapObjClassReactor Class

AcMapObjClassSystem Class

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Object Filters

The AutoCAD Map 3D object-filters feature filters objects (entities) in the current drawing based on the specified filtering criteria.

Topics in this section

Object Filters Detail

Object Filters

The AcDbObjectFilter class is the base class for creating object filters, and provides the following functions:

- Constructor/destructor - AcDbObjectFilter()/~AcDbObjectFilter()
- Filter objects - FilterObjects()
- Activate object filter - IsActive()/SetActive()

For object-filters source-code samples, see Object Filters Samples.

Basic Filters

The AcDbBasicFilter class (derived from The AcDbObjectFilter) filters objects in the current drawing based on layer, feature-class, and block criteria, and provides the following functions:

- Constructor/destructor - AcDbBasicFilter() (two forms)/~AcDbBasicFilter()
- Filter objects - FilterObjects()
- Layer filters:
- Retrieve layers - Layers()
- Set layers - SetLayers() (two forms)
- Add layers - AddLayers()
- Clears layers - ResetLayers()
- Layer status - LayerStatusMask()/SetLayerStatusMask(). See also ELayerStatus enum.

- Feature-class filters:
- Retrieve feature classes - FeatureClasses()
- Set feature classes - SetFeatureClasses() (two forms)
- Add feature classes - AddFeatureClasses()
- Clears feature classes - ResetFeatureClasses()
- Block filters:
- Retrieve blocks - Blocks()
- Set blocks - SetBlocks() (two forms)
- Add blocks - AddBlocks()
- Clears blocks - ResetBlocks()

For object-filters source-code samples, see Object Filters Samples.

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Using Multiple Filters

The AcDbObjectFilterGroup class (derived from The AcDbObjectFilter) filters objects in the current drawing based the based on the criteria of one or more listed filters, and provides the following functions:

- Constructor/destructor - AcDbObjectFilterGroup()/~AcDbObjectFilterGroup()
- Add filter - AddObjectFilter()
- Insert filter - InsertObjectFilter()
- Remove filter - RemoveObjectFilter()/RemoveAllObjectFilter()
- Count filters - ObjectFilterCount()
- Empty test - IsEmpty()
- Retrieve filter - GetObjectFilter()
- Filter objects - FilterObjects()

For object-filters source-code samples, see Object Filters Samples.

Other Information Sources

- For more information about object filters in AutoCAD Map 3D, choose Help &gt; Autodesk Map Help &gt; Index tab, and then type the keywords *filters* and *queries* to display the related topics.

Object Filters Samples

To view code samples of object-filters functions, open the Samples folder in your AutoCAD Map 3D ObjectARX installation and navigate to Map Samples\ObjectFilter.

Object Filters Classes

To view the object-filters classes, click the following links:

AcDbObjectFilter ClassAcDbBasicFilter ClassAcDbObjectFilterGroup Class

Import-Export

Use AutoCAD Map 3D's import-export feature to exchange data in industry-standard GIS and mapping formats.

Topics in this section

Import-Export Detail

By importing a map, you can combine data from other mapping or GIS programs by importing the data into AutoCAD Map 3D. You can import the map objects themselves, and the data and display options associated with them. In addition, you can specify an import area to determine which area of the map will be imported, assign incoming objects to existing feature classes, and automatically perform a coordinate conversion on the objects as they are imported.

By exporting a map, you can export data to an external file format. You can export the map objects themselves, and the data associated with them, and specify that AutoCAD Map 3D performs a coordinate conversion on the objects automatically as they are exported.

Use profiles to save your import and export settings in a profile to automate the process of importing and exporting files. You can save and load import profile files (*.ipf*) or export profile files (*.epf*).

The following file formats are supported for both import and export, unless otherwise indicated:

- ArcView ShapeFile (also called ESRI ShapeFile or ESRI Shape)
- ArcInfo Coverages and E00
- GML (Geography Markup Language) version 2
- GML (Geography Markup Language) version 2, Ordinance Survey of Great Britain MasterMap (import only)
- MapInfo MIF/MID
- MapInfo TAB
- MicroStation DGN versions 7 and 8
- SDTS (Spatial Data Transfer Standard) (import only)

- VML (Vector Markup Language) (export only)
- VPF (Vector Product Format) (import only)

See also Other Information Sources.

Importing MapsSetting Import OptionsExporting MapsSetting Export OptionsUsing Reactors with Export and Import EventsUsing IteratorsHandling ErrorsOther Information SourcesImport-Export SamplesImport-Export Classes, Namespaces, and Globals

Importing Maps

To import an file to an AutoCAD Map 3D drawing, perform the following steps, as shown in the sample code that follows:

1. Retrieve the Autodesk Map importer object, an AcMapIEImporter singleton instance, by calling the global function AcMapImporter().
2. Initialize the importer with Init(). (You must call Init() before you call any other AcMapIEImporter functions.)

   Init() requires an AcMapIEFormat name that specifies the format of the incoming file.
3. Optionally, add reactors to the importer.
4. Set the import options.

   -or-

   Use LoadIPF() to load previously saved import settings from a profile (.ipf) file. (You can save the current import options in a profile file with SaveIPF().)
5. Call Import() to perform the import.

   Import results are stored in an AcMapIE::CImportResults struct.

For import-export source-code samples, see Import-Export Samples.

```
AcMapIE::ErrCode errCode;
// Retrieve the AutoCAD Map 3D importer object.
AcMapIEImporter* pImporter = AcMapImporter();
// Initialize the importer.
char* pszFormat = "MIF"; // Name of an AcMapIEFormat.
```

```
char* pszImpFileName = "C:\\temp\\my_import_file.mif";
errCode = pImporter->Init(pszFormat, pszImpFileName);
if (errCode != AcMapIE::kErr_OK)
{
// Handle the error.
}
// Get an iterator over the layers in the imported file.
AcMapIEInputLayerIterator* pInputLayers;
errCode = pImporter->InputLayerIterator(pInputLayers);
if (errCode != AcMapIE::kErr_OK)
{
// Handle the error.
}
// Iterate over each layer.
for (pInputLayers->Rewind(); !pInputLayers->Done(); pInputLayers->S
{
AcMapIEInputLayer* pLayer = NULL;
if(pInputLayers->Get(pLayer) == false)
{
// Handle the error.
}
// Import attribute data from the import file to the
// new object-data table in the Autocad Map drawing.
// Insert code to set the table type and table name
// with AcMapIEInputLayer::SetDataMapping()
// and set the feature class name
// with AcMapIEInputLayer::SetFeatureClassName().
// Set column mappings.
AcMapIEColumnIterator* pColumns = pLayer->ColumnIterator();
if(pColumns)
{
for (pColumns->Rewind(); !pColumns->Done(); pColumns->Step())
{
// Insert code to set column data mappings
// with AcMapIEColumn::SetColumnDataMapping()
// and set column feature-class mappings
// with AcMapIEColumn::SetColumnClassMapping().
}
delete pColumns;
}
delete pLayer;
}
delete pInputLayers;
// Perform the import and get the results.
AcMapIE::CImportResults results;
bool bUseProgressDialog = false;
errCode = pImporter->Import(results, bUseProgressDialog);
if(errCode != AcMapIE::kErr_OK)
{
// Handle the error.
}
// Process or log the import results, if desired.
```

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Setting Import Options

When importing a drawing into AutoCAD Map 3D, you can set import options for each incoming layer. AcMapIEImporter::InputLayerIterator() retrieves an iterator over all imported layers; each layer is an AcMapIEInputLayer instance, named Name(). Use the following AcMapIEInputLayer functions to set and retrieve layer-level import options:

- Data-mapping table type and name - DataMapping()/SetDataMapping(). See also AcMapIE::ImportDataMapping enum.
- Feature class - FeatureClassName()/SetFeatureClassName()
- Import-layer switch - ImportFromInputLayerOn()/SetImportFromInputLayerOn()
- Layer name - LayerName()/SetLayerName(). See also AcMapIE::LayerNameType enum.
- Point-import mode - PointToBlockMapping()/SetPointToBlockMapping(). See also AcMapIE::PointMappingType enum.
- Target coordinate system - TargetCoordSys()/SetTargetCoordSys(). See also OriginalCoordSys().
- Import-attributes switch - UseForBlockAttributes()/SetUseForBlockAttributes()
- Unique keys for imported objects - UseUniqueKeyField()/SetUseUniqueKeyField()

On each layer, you can set individual mappings from each incoming column to a target column in AutoCAD Map 3D. AcMapIEInputLayer::ColumnIterator() retrieves an iterator over a layer's columns; each column is an AcMapIEColumn instance, named ColumnName(). You can define two types of column mappings, provided that you already have set the column's data table and feature class with AcMapIEInputLayer::SetDataMapping() and

AcMapIEInputLayer::SetFeatureClassName():

- Data mapping - ColumnDataMapping()/SetColumnDataMapping().
- Feature-class mapping - ColumnClassMapping()/SetColumnClassMapping(). Feature-class mappings are not set by default for any column.

You also can use the following AcMapIEImporter functions to set and retrieve high-level import options:

- Audit classified properties - AuditClassifiedAfterImport()/SetAuditClassifiedAfterImport()
- Driver options - DriverOptions()/SetDriverOptions()/InvokeDriverOptionsDialog()
- Import polygons as closed polylines - ImportPolygonsAsClosedPolylines()/SetImportPolygonsAsClosedPolylir
- Location-window filter - LocationWindowAndOptions()/SetLocationWindowAndOptions(). See also AcMapIE::LocationOption enum.
- Reactors - AddReactor()/RemoveReactor(); see Using Reactors with Export and Import Events

For import-export source-code samples, see Import-Export Samples.

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Exporting Maps

To export an AutoCAD Map 3D drawing, perform the following steps, as shown in the sample code that follows:

1. Retrieve the Autodesk Map exporter object, an AcMapIEExporter singleton instance, by calling the global function AcMapExporter().
2. Initialize the exporter with Init(). (You must call Init() before you call any other AcMapIEExporter functions.)

   Init() requires an AcMapIEFormat name that specifies the target file format. You can use FormatName() to retrieve the format name at any time after initialization.

3. Optionally, add reactors to the exporter.
4. Set the export options.

   -or-

   Use LoadEPF() to load previously saved export settings from a profile (.epf) file. (You can save the current export options in a profile file with SaveEPF().)
5. Call Export() to perform the export.

   Export results are stored in an AcMapIE::CExportResults struct.

For import-export source-code samples, see Import-Export Samples.

```
AcMapIE::ErrCode errCode;
// Retrieve the AutoCAD Map 3D exporter object.
AcMapIEExporter* pExporter = AcMapExporter();
// Initialize the exporter.
char* pszFormat = "MIF"; // Name of an AcMapIEFormat.
char* pszExpFileName = "C:\\temp\\my_export_file.mif";
errCode = pExporter->Init(pszFormat, pszExpFileName);
if (errCode != AcMapIE::kErr_OK)
{
// Handle the error.
}
// Insert code to set filter, data mapping,
// and other <a href="#export_options">export options</a>.
// Perform the export and get the results.
AcMapIE::CExportResults results;
bool bUseProgressDialog = false;
errCode = pExporter->Export(results, bUseProgressDialog);
if (errCode != AcMapIE::kErr_OK)
{
// Handle the error.
}
// Process or log the export results, if desired.
```

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Setting Export Options

Use export options to control which objects in the current drawing are exported by applying a layer filter, feature-class filter, and selection set. (CountObjects()

counts the number and type of entities to export.) You also can set storage options, driver options, data mappings, and other options. Use the following AcMapIEExporter functions to set and retrieve export options:

- Discretization angle - DiscretizationAngle()/SetDiscretizationAngle()
- Driver options - DriverOptions()/SetDriverOptions()/InvokeDriverOptionsDialog()
- Export closed polylines as polygons - ClosedPolylinesAsPolygons()/SetClosedPolylinesAsPolygons()
- Feature classes to export - FeatureClassFilter()/SetFeatureClassFilter()
- Layers to export - LayerFilter()/SetLayerFilter()
- Mapping layers to DGN levels - LayerLevelMapping()/SetLayerLevelMapping()
- Polygon topology - ExportFromPolygonTopology()/SetExportFromPolygonTopology()
- Selection set - SelectionSet()/SetSelectionSet() and ExportAll()/SetExportAll()
- Source-column and output-column data mappings - ExportDataMappings()/SetExportDataMappings()
- Storage options - StorageOpts()/SetStorageOpts(). See also AcMapIE::StorageType enum and AcMapIE::GeometryType enum.
- Target coordinate system - TargetCoordSys()/SetTargetCoordSys()
- Unique keys for exported objects - UseUniqueKeyField()/SetUseUniqueKeyField()
- Reactors - AddReactor()/RemoveReactor(); see Using Reactors with Export and Import Events

For import-export source-code samples, see Import-Export Samples.

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Using Reactors with Export and Import Events

TheAcMapIEExportReactorandAcMapIEImportReactorreactor classes provide callback functions that notify an application immediately of export and import events. You can use these mechanisms to monitor or control export and import operations by adding reactor instances. Functions are invoked automatically depending on the stage of the operation, as described in the following tables:

Export reactor function	Invoked
RecordError()	If an error occurs during export
RecordExported()	After an entity is exported
RecordReadyForExport()	Before an entity is exported

Import reactor function	Invoked
RecordError()	If an error occurs during import
RecordImported()	After an entity is imported
RecordReadyForImport()	Before an entity is imported

You can add or remove export reactors with AcMapIEExporter::AddReactor() or AcMapIEExporter::RemoveReactor(), and add or remove import reactors with AcMapIEImporter::AddReactor()or AcMapIEImporter::RemoveReactor(). To use a reactor, perform the following steps, as shown in the sample code that follows:

1. Derive a custom class from AcMapIEExportReactor or AcMapIEImportReactor.
2. Implement events by overriding the virtual functions that you need.
3. Create an instance of the custom reactor.
4. Add the instance so that it becomes active.
5. Write some export or import reactor code.

6. Remove the reactor and delete it.

For import-export source-code samples, see Import-Export Samples.

```
// Derive a custom class from AcMapIEExportReactor.
class AcMapIEMyExportReactor : public AcMapIEExportReactor
{
// Override virtual functions for the desired export events.
} ;
// Create an instance of the custom reactor.
AcMapIEMyExportReactor* pMyReactor = new AcMapIEMyExportReactor;
// Add the custom reactor.
AcMapIEExporter().AddReactor(pMyReactor);
// Insert export reactor code here.
// Remove the reactor and delete it.
AcMapIEExporter().RemoveReactor(pMyReactor);
delete pMyReactor;
```

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Using Iterators

The following table lists the iterator classes, which provide iterators over collections of objects that import-export functions return or take. The AcMapIEExpressionTargetIteratorand AcMapIENameValueIteratorclasses allow you to modify the iterator's underlying collection by adding, updating, and deleting elements, whereas the other classes iterate over fixed collections. The global functionsAcMapExportFormatIterator()andAcMapImportFormatIterator()return the export-format and import-format iterators, respectively.

Class	Iterates over a collection of
AcMapIEColumnIterator	AcMapIEColumn instances
AcMapIEExpressionTargetIterator	Expression-target pairs
AcMapIEFormatIterator	AcMapIEFormat instances
AcMapIEInputLayerIterator	AcMapIEInputLayer instances

AcMapIENameValueIterator	Name-value pairs

For import-export source-code samples, see Import-Export Samples.

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Handling Errors

Many functions in the various import-export classes return an AcMapIE::ErrCode error code. When a particular function returns an error code, read that function's documentation for function-specific error conditions rather than relying on only the generic error descriptions in the AcMapIE::ErrCode documentation.

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Other Information Sources

- For more information about importing and exporting maps in AutoCAD Map 3D, choose Help &gt; AutoCAD Map 3D Help &gt; Contents tab (or press F1), and then navigate to Using AutoCAD Map 3D (by feature) &gt; Importing and Exporting Maps.
- For an import-export tutorial in AutoCAD Map 3D, choose Help &gt; Tutorials &gt; Contents tab, and then choose "Importing and Exporting Data".

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Import-Export Samples

To view code samples of import-export functions, open the Samples folder in your AutoCAD Map 3D ObjectARX installation and navigate to Map Samples\ImportExport.

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Import-Export Classes, Namespaces, and Globals

To view the import-export classes, namespaces, and globals, click the following links:

AcMapIEColumn ClassAcMapIEColumnIterator ClassAcMapIEExporter ClassAcMapIEExportReactor ClassAcMapIEExpressionTargetIterator ClassAcMapIEFormat ClassAcMapIEFormatIterator ClassAcMapIEImporter ClassAcMapIEImportReactor ClassAcMapIEInputLayer ClassAcMapIEInputLayerIterator ClassAcMapIENameValueIterator ClassAcMapIE NamespaceAcMapExporter Global FunctionAcMapExportFormatIterator Global FunctionAcMapImporter Global FunctionAcMapImportFormatIterator Global Function

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Oracle Spatial Data

This topic describes the latest implementation of the Oracle Spatial API.

Topics in this section

- Oracle Spatial Data Detail

Oracle Spatial Data Detail

Class names in this API begin with "AcMapOSE". Use it for all new development that involves Oracle Spatial access, or consider using the FDO Enabler API, a still later implementation, which provides access to Oracle Spatial databases and other database formats as well.

Although the earlier implementation of the Oracle Spatial API remains in place, and existing code that is based on it is still valid, it is deprecated. Class names in the earlier Oracle Spatial API begin with "AcMapOracle". The AcMapOracle classes are described in the AutoCAD Map 3D ObjectARX Reference, but they are not discussed in the Developer's Guide.

Managing the connection

Before you can do anything else, you must get the AcMapOSEConnection object.

So long as AutoCAD Map 3D is running, there is always an AcMapOSEConnection object, even if no connection is currently in effect. The object is instantiated automatically when an AutoCAD Map 3D session opens, and is destroyed automatically when the session closes.

Because the AcMapOSEConnection object is unique within a session, there can never be more than one connection in effect at a time. To connect, disconnect, or change the current connection, you modify this unique object. You can modify it (or assess its state) either through the the UI or the API. It's the same object either way.

AcMapOSEConnection class

AcMapOSEGetConnection global function

Connecting to an Oracle Spatial Database

Managing reactors

In addition to functions for modifying or assessing its state, the AcMapOSEConnection object has functions for managing reactors. For example, to monitor and react to connection events, subclass a custom reactor from AcMapOSEConnectionReactor, and then add an instance of it to your application using AcMapOSEConnection::AddConnectionReactor(). Similarly, you can create and add reactors for import and export events.

AcMapOSEConnection class

AcMapOSEConnectionReactor class

AcMapOSEExportReactor class

AcMapOSEImportReactor class

Connecting to an Oracle Database (sample)

Exporting data

To add new records to the Oracle database, or to update records that were imported and then edited by adding, changing, or deleting data, use an AcMapOSEExport object. To set export options and specify which features will be exported, use AcMapOSEExport::Init().

Note that an AcMapOSEExport object has two functions for exporting. ExportObjects() exports objects listed in an AcDbObjectIdArray. ExportObjectsAll() exports all objects in the drawing database. Both functions export only features specified in the vFeaturesNames argument of AcMapOSEExport::Init(), and both functions are subject to export options specified by the nOptions argument of AcMapOSEExport::Init(). Option values are defined in the AcMapOSEExport::EExportOptions enumeration.

To monitor and react to export events, use a custom subclass of AcMapOSEExportReactor.

Note that, for the sake of performance, the export operation does not process a set of objects one by one. Rather, it collects the objects with their associated data in a cache and then bulk-processes them. The complement of AcMapOSEExportReactor functions reflects this two-step process.

AcMapOSEExport class

AcMapOSEExport::EExportOptions enumeration

AcMapOSEExportReactor class

Exporting to an Oracle Spatial Database

Querying and importing data

To import objects from an Oracle database to a project drawing, first use an AcMapOSEQuery object to specify conditions for the objects to import, and then use an AcMapOSEImport object for the import itself.

You can initialize the AcMapOSEQuery object with

- The current import query, as defined in the Import dialog box in the user interface.

  To see this dialog, use the MAPOSEREAD command.

- An import query loaded from the Oracle database after saving one there previously.

- An explicit set of conditions.

After initializing the AcMapOSEQuery object, you can convert its query to SQL format for viewing purposes.

To monitor and react to import events, use a custom subclass of AcMapOSEImportReactor.

AcMapOSEQuery class

AcMapOSEImport class

AcMapOSEImportReactor class

Importing from an Oracle Spatial Database

Oracle and AutoCAD IDs

In Oracle databases, entities have Oracle IDs (OValue). In AutoCAD databases, they have AutoCAD IDs (AcDbObjectId). When drawing objects are imported from an Oracle database to a project drawing (AcMapProject object), AutoCAD Map 3D assigns them AutoCAD IDs, but keeps track their corresponding Oracle IDs. Note however, that this information is discarded without saving when the drawing closes, which means that the entire process of updating a set of Oracle records — importing, editing, exporting — must run from start to finish on a continuously open drawing.

For information about getting corresponding IDs, click <img height="12" width="12" border="0" src="graphics/chiclet.gif"> .

Getting corresponding IDs

If you have imported a set of records from an Oracle database, and you need to know explicitly which record is associated with a given drawing object (entity), or which entity with a given record, you can use an AcMapOSEObject object to find out. After intializing such an object with an entity's AutoCAD ID, you can get its Oracle ID, and vice-versa, provided that the drawing has remained open since the entity was imported. If the drawing has not remained open, imported entities lose their imported status, in which case, instead of the AcMapOSEObject object giving you an Oracle ID in exchange for an entity's AutoCAD ID, it gives you 0 (an invalid key value), as it does for any entity that is not an imported one.

For information about Oracle and AutoCAD IDs, click <img height="12"

width="12" border="0" src="graphics/chiclet.gif"> .

Getting other information

You can use AcMapOSEObject functions to get other information about a queried object besides its AutoCAD or Oracle ID. For example, its EditSet status, in or out.

AcMapOSEObject class

Getting Corresponding IDs

Filtering objects

To filter new objects from a set of drawing objects, use AcMapOSEProject::FilterNewObjects(). In addition, you can constrain the result by feature or edit-set status (in or out).

Likewise, to filter queried objects, use AcMapOSEProject::FilterQueriedObjects(). In addition, you can constrain the result by feature or edit-set status (in or out). Queried objects are delivered in three subsets by edit status: erased, modified, and unchanged.

AcMapOSEProject class

Filtering Objects

Error processing

When an AutoCAD Map 3D operation fails, the error message and error code are pushed to the error stack (AcMapErrorStack). In the event of an error, check the stack to discover what went wrong and take appropriate action.

Other information sources

For more information about AutoCAD Map 3D and Oracle Spatial data, refer to

- *User Interface Help for the Polygon and Advanced Oracle Extension to AutoCAD Map 3D*— In the Autodesk Map application, click the question mark icon in the Polygon And Advanced Oracle Extension toolbar.

Code samples

To view code samples, click links below.

Connecting to an Oracle Spatial Database

Exporting to an Oracle Spatial Database

Importing from an Oracle Spatial Database

Subclassing Custom Reactors

Getting Corresponding IDs

Filtering Objects

The following topics describe sample ObjectARX projects. The project folders are under Map Samples\Oracle Spatial in your AutoCAD Map 3D ObjectARX installation.

Storing Block Attribute Positions in an Oracle Spatial Database

Storing Block Definitions in an Oracle Spatial Database

Importing From an Oracle Spatial Database

Note The sample projects that are located in Map Samples\Oracle are for the earlier Oracle Spatial implementation, which is still supported, but is now deprecated.

Classes

To view Oracle Spatial data classes, click links below.

AcMapOSEConnection

AcMapOSEConnectionReactor

AcMapOSEExport

AcMapOSEExportReactor

AcMapOSEImport

AcMapOSEImportReactor

AcMapOSEObject

AcMapOSEProject

AcMapOSEQuery

Oracle Spatial Samples

The Oracle Spatial samples.

Connecting to an Oracle Spatial DatabaseSubclassing Custom ReactorsExporting to an Oracle Spatial DatabaseImporting From an Oracle Spatial DatabaseGetting Corresponding IDsFiltering Objects

Topics in this section

- Connecting to an Oracle Spatial Database
- Subclassing Custom Reactors
- Exporting to an Oracle Spatial Database
- Importing from an Oracle Spatial Database
- Getting Corresponding IDs
- Filtering Objects

Connecting to an Oracle Spatial Database

The following code sample illustrates connecting to an Oracle database and adding custom reactors.

Custom reactor declarations are in MyMapOracleReactors.h, one of the files included at the beginning of the sample. The "Subclassing Custom Reactors" sample shows what such a file would contain.

Managing the Connection (Overview)Subclassing Custom Reactors (Sample)Other Related Samples

```
#include "StdAfx.h"
#include "StdArx.h"
#include "AdMapOracleConnection.h"
#include "MyMapOracleReactors.h"   // Custom reactors
BOOL ConnectToOracle()
{

 // Get connection pointer
 AcMapOSEConnection *pConnection = AcMapOSEGetConnection();
 // Initialize reactors
 MyConnectionReactor *pConnectReactor = new MyConnectionReactor();
 MyExportReactor *pExportReactor = new MyExportReactor();
 MyImportReactor *pImportReactor = new MyImportReactor();
 // Add reactors to connection object
 pConnection->AddConnectionReactor(pConnectReactor);
 pConnection->AddExportReactor(pExportReactor);
 pConnection->AddImportReactor(pImportReactor);
 // Make the connection
 BOOL bConnect = FALSE;
 if(!pConnection->IsConnected())
 {

  bConnect = pConnection->Connect("Scott", "TestDB", "Scott", "Ti

 }
 else
 {
  acutPrintf("Already connected to Oracle!");
  return FALSE;

 }
 // Check for valid connection using various diagnostic functions
 // Check if schema is valid()
 if(pConnection->IsSchemaValid())
 {

  acutPrintf("\nSchema is valid for this connection\n");

 }
 else
 {

  acutPrintf("\nSchema is not valid\n");

 }
 // Get the latest state of the Oracle database if it has been
 // changed since the connection was made
 if(pConnection->RefreshSchema())
 {

  acutPrintf("\nSchema refreshed\n");

 }
 else
 {

  acutPrintf("\nError refreshing schema\n"):

 }
 // Get a list of the feature names in the current schema
 std::vector<std::string> vFeatureNames;
 if(pConnection->Features(vFeatureNames))
 {

  acutPrintf("\nGot feature names\n");

 }
 else
 {

  acutPrintf("\nError getting feature names\n");

 }
 // Get the service name
 char *pService = 0;
 pSerive = new char[80];
 strcpy(pService, pConnection->Service());
 acutPritnf("\nService is %s\n",pService);
```

```
   delete [] pService;
   // Get the schema name
   char *pSchema = 0;
   pschema = new char[80];
   strcpy(pSchema,pConnection->Schema());
   acutPritnf("\nSchema is %s\n",pSchema);
   delete [] pSchema;
   // Get the user name
   char *pUserName = 0;
   pUserName = new char[80];
   strcpy(pUserName,pConnection->UserName());
   acutPritnf("\nUserName is %s\n",pUserName);
   delete [] pUserName;
   // Break the connection
   if(pConnection->Disconnect())

    acutPritnf("\nDisconnected from Oracle\n");

   else

    acutPritnf("\nError disconnecting from Oracle\n");

   // Remove reactors from connection interface
   pConnection->RemoveConnectionReactor(pConnectReactor);
   pConnection->RemoveExportReactor(pExportReactor);
   pConnection->RemoveImportReactor(pImportReactor);
   delete pConnectReactor
   delete pExportReactor
   delete pImportReactor

  }
```

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Subclassing Custom Reactors

The following sample code illustrates subclassing custom reactors from AcMapOSE[xx]Reactor classes.

Classes and functions are declared, but function definitions, which would be highly implementation specific, are not shown. This is an example of what MyMapOracleReactors.h, one of the include files in the "Connecting to an Oracle Database" sample, would contain.

Managing reactors

Connecting to an Oracle Spatial Database

Code samples

```
#include "AdMapOracleReactor.h"
class MyConnectionReactor : public AcMapOSEConnectionReactor
{
public:

 MyConnectionReactor();
 virtual ~MyConnectionReactor();
 virtual void Connected();
 virtual void Disconnected();
 virtual void BeforeConnect();
 virtual void BeforeDisconnect();

};
class MyExportReactor : public AcMapOSEExportReactor
{
public:

 MyExportReactor();
 virtual ~MyExportReactor();
 virtual void BeforeObjectCached(AcDbEntity *);
 virtual void ObjectCached(AcDbEntity *,OValue);
 virtual void ObjectRejected(AcDbEntity *);
 virtual void BeforeObjectsExported(std::vector<OValue> &);
virtual void ObjectsExported(std::vector<OValue> &);
};
class MyImportReactor : public AcMapOSEImportReactor
{
public:

 MyImportReactor();
 virtual ~MyImportReactor();
 virtual void BeforeRecordImport(const ODynaset &);
 virtual void RecordImported(const ODynaset &,AcDbEntity *);
 virtual void RecordRejected(const ODynaset &);

};
```

Exporting to an Oracle Spatial Database

The following code sample illustrates exporting spatial data from a project drawing to an Oracle database.

Note The sample assumes an open project drawing containing some objects. It also assumes that the connection object is actually connected to a database. Click "Connecting to an Oracle Database" for sample code.

Connecting to an Oracle Spatial Database (Sample)Exporting Data (Overview)Related Samples

```
#include "StdAfx.h"
#include "StdArx.h"
#include "AdMapOracleConnection.h"
#include "AdMapOracleExport.h"
BOOL ExportToOracle()
{
// Get connection pointer
AcMapOSEConnection *pConnection = AcMapOracleGetConnection();
// Declare export interface
AcMapOSEExport *pExport = new AcMapOSEExport(pConnection);
// Note: Before calling export functions, initialize the
// export interface to specify export options and which
// features to export
// Export Option 1 - Export only new objects and erase
// exported objects from the drawing
// Empty feature vector means export all features in the
// drawing database when you call export functions
std::vector<std::string> vFeatureNames;
// Initialize
if(pExport->Init(vFeatureNames, kRemoveExported))
{

 acutPrintf("\nInit() successful\n");
 // Export
 AcDbDatabase *pDwg;
 // Get a valid drawing database reference for *pDwg
 // ... (add code here)
```

```
  if(pExport->ExportObjectsAll(pDwg))
  {

   acutPrintf("\nExport successful\n");

  }
  else
  {

   acutPrintf("\nExport failed\n");

  }

}
else
{

 acutPrintf("\nExport->Init() failed\n");

}
// Export Option 2 - Export selected features, update
// modified objects in Oracle, and delete erased objects
// from Oracle
vFeatureNames.push_back("Feature1");
vFeatureNames.push_back("Feature2");
// Initialize
if(pExport->Init(vFeatureNames,
AcMapOSEExport::kUpdateModified |
AcMapOSEExport::kUpdateErased |
AcMapOSEExport::kRemoveExported))
{

 acutPrintf("\nInit() successful\n");
 // Export
 if(pExport->ExportObjectsAll(pDwg))
 {

  acutPrintf("\nExport successful\n");

 }
 else
 {

  acutPrintf("\nExport failed\n");

 }

}
else
{
   acutPrintf("\nExport->Init() failed\n");

  }
  // Export Option 3 - Export a specific set of objects
  // Initialize - see initializing code samples above
  // Export
  AcDbObjectIdArray idArray;
  // Populate idArray with a set of objects to export by
  // manually selecting or iterating through the drawing
  // database
  // ... (add code to populate idArray)
  if(pExport->ExportObjects(idArray);
  {

   acutPrintf("\nExport successful\n");

  }
  else
  {

   acutPrintf("\nExport failed\n");

  }
  delete pExport;

 }
```

Importing from an Oracle Spatial Database

The following sample illustrates importing spatial data from an Oracle database to a project drawing.

The sample is in two parts. First, it defines a query to specify a condition for the objects to import, and then it imports them.

Note The sample assumes that there is an open project drawing, and that an import query has been defined already through the Import dialog box in the UI (use the MAPOSEREAD command). It also assumes that the connection object is actually connected to a database. Click "Connecting to an Oracle Database" for sample code.

Connecting to an Oracle Spatial Database

Querying and importing data

Code samples

```
#include "StdAfx.h"
#include "StdArx.h"
#include "AdMapOracleConnection.h"
#include "AdMapOracleQuery.h"
#include "AdMapOracleImport.h"
BOOL ImportFromOracle()
{

 // Define Query
 // Get connection pointer
 AcMapOSEConnection *pConnection = AcMapOSEGetConnection();
 // Declare query interface
 AcmapOSEQuery *pQuery = new AcMapOSEQuery(pConnection);
 // Initialize query interface with the current import query
 // (defined through the user interface) of an open project
 // drawing; in this case, the current project drawing
 pQuery->InitWithCurrent(
 acdbHostApplicationServices()->workingDatabase());
```

```
  // Or initialize with a NULL database, which has the same
  // effect as the previous call
  pQuery->InitWithCurrent();
  // Or initialize with specific condition(s)
  // Empty vector of features means query all features in the
  // Oracle database
  std::vector<std::string> vFeatureNames;
  pQuery->AddWhereConditionInFeatures(
  vFeatureNames,
  "AdMapEntityType IS NOT NULL");
  // You can clear the query with pQuery->Clear(),
  // but not right now; we still need it
  // Check the query with ConvertToSql()
  char *psql = pQuery->ConvertToSql();
  // Save the query to the Oracle database
  pQuery->Save("MyQuery");
  // Load the saved query into another query object
  AcMapOSEQuery *pNewQuery = new AcMapOSEQuery(pConnection);
  pNewQuery->Load("MyQuery");
  // Compare old and new queries
  char *pNewSql = pNewQuery->ConvertToSql();
  if(strcmp(pSql,pNewSql) == 0)

   acutPrintf("Query Load/Save works!\n");

  else

   acutPrintf("Query Load/Save failed!\n");

  // Import Data
  AcMapOSEImport *pImport = new AcMapOSEImport(pConnection);
  // Use query defined above to import data
  if(pImport->Import(pQuery))

   acutPrintf("\n Import successful\n");

  else

   acutPrintf("\n Import failed\n");

  delete pQuery;
  delete pImport;

 }
```

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Getting Corresponding IDs

The following sample demonstrates getting an entity's Oracle ID if its AutoCAD ID is known, and vice versa.

It also demonstrates that round trips with corresponding IDs are reliable — that if you use an AutoCAD ID to get an Oracle ID, and then use the Oracle ID to get an AutoCAD ID, the two AutoCAD IDs are the same.

Note The sample assumes an open project drawing containing imported entities. It also assumes that the connection object is actually connected to a database. Click "Connecting to an Oracle Database" for sample code.

Connecting to an Oracle Spatial DatabaseOracle and AutoCAD IDsGetting corresponding IDsCode samples

```
#include "StdAfx.h"
#include "StdArx.h"
#include "AdMapOracleConnection.h"
#include "AdMapOracleIdentification.h"
BOOL Identification()
{

 // Get connection pointer
 AcMapOSEConnection *pConnection = AcMapOSEGetConnection();
 // Declare identification object
 AcMapOSEObject *pId = new AcMapOSEObject(pConnection);
 AcDbObjectId AcadId;
 AcDbEntity *pEntity;
 ads_name en;
 ads_point pt;
 OValue OracleID;
 char pBuf[100];
 // Get a drawing object (entity) from the user
 if(acedEntSel("\nSelect an entity: ", en , pt) == RTNORM)
 {

  // Get the entity's AutoCAD ID
```

```
acdbGetObjectId(AcadId, en);
// Get the entity's handle and print it to the AutoCAD Map 3D t
if (Acad::eOk == acdbOpenAcDbEntity( pEntity, AcadId, AcDb::kFo
{

 AcadId.handle().getIntoAsciiBuffer(pBuf);
 acutPrintf("\nAcad handle sel:%s",pBuf);
 pEntity->close();

}
// Initialize identification object with AutoCAD ID
bInit = pId->Init(AcadId);
// Get the entity's corresponding Oracle ID
OracleID = pId->GetOracleID();
// Again initialize identification object, now with Oracle ID
bInit = pId->Init(OracleID);
// Get the entity's corresponding AutoCAD ID
AcadId = pId->GetAcadID();
// Get the entity's handle and print it to the AutoCAD Map 3D t
// and note that it is the same entity as before
if (Acad::eOk == AcDbOpenAcDbEntity( pEntity, AcadId, AcDb::kFo
{

 AcadId.handle().getIntoAsciiBuffer(pBuf);
 acutPrintf("\nAcad handle sel:%s",pBuf);
 pEntity->close();

}
// You can get other information about this entity besides its 
// FeatureName()
char *pName;
strcpy(pName,pId->FeatureName());
acutPrintf("\nFeatureName = %s\n",pName);
// IsInEditSet()
if(pId->IsInEditSet())
{

 acutPrintf("\nObject is locked\n");

}
else
{

 acutPrintf("\nObject is not locked\n");

}
// IsModified()
if(pId->IsModified())
{
     acutPrintf("\nObject has been modified\n");
    }
    else
    {

     acutPrintf("\nObject has not been modified\n");
    }
    // IsErased()
    if(pId->IsErased())
    {

     acutPrintf("\nObject has been erased\n");
    }
    else
    {

     acutPrintf("\nObject has not been erased\n");
    }
    // AddToEditSet()
    if(pId->AddToEditSet())
    {

     acutPrintf("\nObject added to EditSet\n");
    }
    else
    {

     acutPrintf("\nObject not added to EditSet\n");
    }
    // RemoveFromEditSet()
    if(pId->removeFromEditSet())
    {

     acutPrintf("\nObject removed from EditSet\n");
    }
    else
    {

     acutPrintf("\nObjects not removed from EditSet\n");
    }
    // Version()
    unsigned long ulVersion;
    ulVeresion = pId->Version();
    // IsUpToDate()
    if(pId->IsUpToDate())
    {

     acutPrintf("\nObject is up to date\n");

    }
    else
    {

     acutPrintf("\nObject has been modified since importing it\n");

    }
    // WhoHasIt()
    unsigned long ulUserId;
    std::string strNtuser, strDbUser, strMapUser, strComputer, strL
    if(pId->WhoHasIt(
    ulUserId,
    strNtUser,
    strDbUser,
    strMapUser,
    strComputer,
    strLoginTime))
    {

     acutPrintf("\nUserId = %ul\n",ulUserId);
     acutPrintf("\nNtUser  = %s\n",strNtUser.data());
     acutPrintf("\nDbuser = %s\n",strDbUser.data());
     acutPrintf("\nMapUser  = %s\n",strMapUser.data());
     acutPrintf("\nComputer = %s\n",strcomputerr.data());
     acutPrintf("\nLoginTime = %s\n",strComputer.data());

    }
    else
    {

     acutPrintf("\nObject is not locked\n");

    }
   }  // if(acedEntSel("\nSelect an entity: ", en , pt) == RTNORM)
   acadSSFree(en);
   delete pId;

  }
```

Filtering Objects

The following code sample illustrates filtering queried and new drawing objects, and adding and removing objects from the EditSet.

Filtering objects

Code samples

```
#include "StdAfx.h"
#include "StdArx.h"
#include "AdMapOracleConnection.h"
#include "AdMaporacleProject.h"
BOOL FilterProjectObjects()
{

 // Get connection pointer
 AcMapOSEConnection *pConnection = AcMapOSEGetConnection();
 // Declare project interface
 AcMapOSEProject *pProject = new AcMapOSEProject(pConnection);
 // Initialize project interface with a drawing database
 if(pProject->Init(
 acdbHostApplicationServices()->workingDatabase()))
 {

  acutPrintf("\nProject interface initialized\n");

 }
 else
 {

  acutPrintf("\nError initializing project interface\n");

 }
 // Filter queried objects
 // Empty vector of features means filter all features in
 // the drawing database
 std:vector<std:string> vFeatureNames;
 // Similarly empty input array of objectIds means filter
 // all objects in the drawing database
```

```
AcDbObjectIdArray arrInput, arrErased;
AcDbObjectIdArray arrModified, arrUnchanged, arrFilteredOut;
if(pProject->FilterQueriedObjects(
vFeatureNames,
arrInput,
arrErased,
arrModified,
arrUnchanged,
arrFilteredOut,
AcMapOSEProject::kInEditSet | AcMapOSEProject::kNotInEditSet))
{

 acutPrintf("\n Input array   = %d\n",arrInput.length());
 acutPrintf("\n Erased array  = %d\n",arrErased.length());
 acutPrintf("\n Modified array = %d\n",arrModified.length());
 acutPrintf("\n Unchanged array = %d\n",arrUnchanged.length());
 acutPrintf("\n Filter array  = %d\n",arrFilteredOut.length());

} else {

 acutPrintf("\nFilterQueriedObjects() returned false\n");

}
// Filter new objects
// Filter these features
vFeatureNames.push_back("Feature1");
vFeatureNames.push_back("Feature2");
// Empty input array of objectIds means filter all objects
// in the drawing database
AcDbObjectIdArray arrInput, arrNew, arrFilteredOut;
if(pProject->FilterNewObjects(
vFeatureNames,
arrInput,
arrNew,
arrFilteredOut,
AcMapOSEProject::kInEditSet | AcMapOSEProject::kNotInEditSet))
{

 acutPrintf("\n Input array = %d\n",arrInput.length());
 acutPrintf("\n New array  = %d\n",arrErased.length());
 acutPrintf("\n Filter array = %d\n",arrFilteredOut.length());

} else {

 acutPrintf("\nFilterNewObjects() returned false\n");

}
// Add objects to EditSet
// Populate arrAcadIds with drawing objects by manually
// selecting or iterating through drawing database;
```

```
   // arrFilteredOut reports objects that could not be
   // added to the EditSet
   AcDbObjectIdArray arrAcadIds, arrFilteredOut;
   // ... (add code to populate arrAcadIds)
   if(pProject->AddToEditSet(arrAcadIds, arrFilteredOut))
   {

    acutPrintf("\nObjects added to EditSet\n");

   }
   else
   {

    acutPrintf("\nError adding objects to EditSet\n");

   }
   // Remove objects from EditSet
   // Populate arrAcadIds with drawing objects by manually
   // selecting or iterating through drawing database;
   // arrFilteredOut reports objects that could not be
   // removed from the EditSet
   AcDbObjectIdArray arrAcadIds, arrFilteredOut;
   // ... (add code to populate arrAcadIds)
   if(pProject->RemoveFromEditSet(arrAcadIds, arrFilteredOut))
   {

    acutPrintf("\nObjects removed from EditSet\n");

   }
   else
   {

    acutPrintf("\nError removing objects from EditSet\n");

   }
   delete pProject;

  }
```

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Oracle Spatial Sample Projects

The Oracle Spatial sample projects.

Importing From an Oracle Spatial Database Storing Block Definitions in an Oracle Spatial Database Storing Block Attribute Positions in an Oracle Spatial Database

The project folders are in the Map Samples\Oracle Spatial folder in AutoCAD Map 3D ObjectARX installations.

Note The sample projects that are in Map Samples\Oracle are for the earlier Oracle Spatial implementation, which is still supported, but is now deprecated.

Topics in this section

- Importing From an Oracle Spatial Database
- Storing Block Definitions in an Oracle Spatial Database
- Storing Block Attribute Positions in an Oracle Spatial Database

Importing From an Oracle Spatial Database

Oracle Spatial Data (Overview) Related Samples

The "Importing From an Oracle Spatial Database" sample is an ObjectARX project located in the Map Samples\AcMapFlatOrclQuery folder in AutoCAD Map 3D ObjectARX installations.

Commands Implemented

The project creates an rx module which exposes the following commands.

- ORAAPICONNECT — for connecting to the Oracle database.
- ORAAPIIMPORT — for reviewing, composing, or running queries
- ORAAPIDISCONNECT — for disconnecting.

Import dialog box

The ORAAPIIMPORT command opens the Import dialog box, which includes the following elements, among others.

- Condition Samples — A list of conditions read from SqlWhereClauses.txt on the local machine. Click a condition to view or change it.
- Connect — Click to connect to the Oracle database if not connected already.
- Features — When connected, a list of features in the current schema. Click a feature and then click Get Aliases to display a list of aliases and corresponding names for the feature's tables. See "Table Aliases" below.

Table aliases

To compose a condition for a given feature, you have to specify which table to use if the feature has more than one, and you have to refer to this table by its alias. If there is only one table, its alias is "Table0" and specifying it is optional. The following condition uses a table alias.

```
Select *
From RIVERS Table0
Where Table.DEPTH > 5;
```

To get table aliases when there is more than one table for a feature, click Get Aliases in the Import dialog.

Column types

To write a condition, you may need the type of a given column. To get column types, click Describe Table in the Import dialog box to get information about any table in the current schema.

To create a query

1. Select one or more features in the Features list box.
2. Type a WHERE clause in the edit control below the Condition Samples list.

   The WHERE clause is applied to each of the selected features as it is typed, without checking to see if it is valid. If the condition is not valid — for example, if it references a table that does not belong to the feature — the query fails when it executes.
3. Click View Sql Statement to see the corresponding SQL statement.

   If more than one feature is selected, there will be a corresponding number of SQL statements.
4. Click Save to save the query for future use.
5. Click Import to run the query and import objects.

To view a saved query

- Click Load.

  This action loads a query from the table ADMPIMPORTSETTINGS in the current schema and displays its SQL statement in a separate dialog box. You can't execute the query, but you can view it, and you can copy parts of it to use in other queries.

To run a query

- Click Import.

Note

Keep in mind that the purpose of this application is to instruct. It lacks extensive error handling. Use it with caution.

Storing Block Definitions in an Oracle Spatial Database

Oracle Spatial Data (Overview) Related Samples

The "Storing Blocks" sample is an ObjectARX project located in the Map Samples\AcMapFlatOrclBlock folder in AutoCAD Map 3D ObjectARX installations.

Classes highlighted

It highlights the following Oracle Spatial classes.

AcMapOSEExportReactor

The following classes are included also, but their use is less extensive.

AcMapOSEConnection

Commands implemented

The project creates an rx module which exposes the following commands.

- SAVEBLOCKTOORACLE installs custom export and connection reactors. These reactors enable storing block definitions in an Oracle database.
- LOADBLOCKSFROMORACLE reads block definitions from an Oracle database and places them in the table record of the active project drawing. This command should be executed to set block definitions in place before importing block references.
- STOPSAVEBLOCKTOORACLE removes the custom reactors that were added by SAVEBLOCKTOORACLE.

Note

Keep in mind that the purpose of this application is to instruct. Use it with caution. It lacks extensive error handling, and it may bog down when the data set is large.

Storing Block Attribute Positions in an Oracle Spatial Database

Oracle Spatial Data (Overview) Related Samples

The "Storing Block Attribute Positions" sample is an ObjectARX project located in Map Samples\AcMapFlatOrclAttrPos in AutoCAD Map 3D ObjectARX installations.

Classes Highlighted

It highlights the following Oracle Spatial classes.

AcMapOSEConnection AcMapOSEImportReactor AcMapOSEExportReactor AcMapOSEObject

The following classes are included also, but their use is less extensive.

AcMapOSEImport AcMapOSEExport AcMapOSEQuery AcMapOSEConnectionReactor

Commands implemented

The project creates an rx module which lets the user change attribute positions in a project drawing and preserve these changes in an Oracle database. It exposes the following commands.

- APEXPORT exports the active project drawing to an Oracle database, including information about attribute positions.
- APIMPORT imports Oracle Spatial data to the active project drawing, restoring attributes to their original positions.

Note

The sample assumes that features are already defined completely using our MAPOSEADMIN command.

Keep in mind that the purpose of this application is to instruct. Use it with caution. It lacks extensive error handling, and it may bog down when the data set is large.

Topology

An AutoCAD Map 3D topology is a set of objects and the object data that defines the relationships between the objects.

Topics in this section

Topology Detail

A *node topology* defines the interrelation of nodes (point objects). Node topologies often are used in conjunction with other topologies in analysis. Examples of node topologies include street lights, city-maintained trees, or drill holes for core samples. A *network topology* considers the interconnection of links (lines) forming a linear network. Links can connect nodes. Examples of network topologies include a street network and a water-distribution application that traces the flow of water from a pumping station to residences. A *polygon topology* defines polygons that represent enclosed areas such as land parcels and census tracts. A single link defines the common boundary between adjacent areas. A polygon topology can be used for tax assessment and land planning in which parcels of land are represented by polygons. Polygon topologies can represent political boundaries, such as voting districts, city, state, or provincial boundaries, special districts, and school districts.

With topologies, you can perform spatial analyses such as:

- Trace through network topologies (shortest-path traces, best-route analysis, and flood traces)
- Find the area within a certain distance of map features (by creating buffers)
- Dissolve and overlay polygon topologies
- Determine conditions of adjacency (what is next to what), containment (what is enclosed by what), and proximity (how close something is to something else)

Topology information is stored as object data on each element that makes up the topology. This data can be saved as part of the current map, or saved back to a source drawing. Because topology is definable for a map, identifiers used to store the topology are unique to the map. Topology in each drawing must be separate and unique. Autodesk Map does not support topology data that spans several drawing files (such as tiled maps) unless they are combined in a project.

You must create centroids for mpolygons and closed polylines before building a topology with them.

See Creating Centroids.

You must clean drawing objects before building a topology with them.

See Drawing Cleanup.

Creating and Managing Topologies

AcMapTopologyAcMapTopologyManager

- Close a topology - Close()
- Create an instance of topology - AcMapTopology()
- Create a fully specified topology - Create() (two forms). See also ETopologyType enum and ECreateOptions enum.

  Prior to creating a new topology with Create(), call the following functions to override the default centroid-, edge-, and node-creation settings:
- SetCentroidCreationSettings(). See also AcMapPointCreationSettings class.
- SetEdgeCreationSettings(). See also AcMapEntityCreationSettings class.
- SetNodeCreationSettings(). See also AcMapPointCreationSettings class.
- Delete a topology - Delete()
- Existence test - TopologyExists() (two forms). See also ETopologyScope enum.
- Open a topology in the current drawing - Open(). See also EOpenMode enum.
- Open a topology in the current and source drawings - Open(). See also EOpenMode enum and EAuditResults enum.
- Update a topology - Refresh()/NeedsRefresh()

For topology source-code samples, see Topology Samples.

```
// Create a topology object, verify it, close it, and destroy it.
AcMap::EErrCode errCode;
ETopologyType eType = ePoint;
const char* pszTopologyName = "MyNodeTopology";
// For safety, usually add the existence test
// if (AcMapTopologyManager::TopologyExists(pszTopologyName)){...}
// before creating a new topology.
AcMapTopology* pTopology = new AcMapTopology(pszTopologyName);
// See <a href="#samples">Topology Samples</a> for sample code
// that shows how to populate these arrays.
AcDbObjectIdArray edgeObjIds;
AcDbObjectIdArray nodeObjIds;
AcDbObjectIdArray centroidObjIds;
...
errCode = pTopology->Create(edgeObjIds, nodeObjIds, centroidObjIds
if(AcMap::kOk == errCode)
{

 // Verify the result by closing and reopening the newly created t
 pTopology->Close();
 pTopology->Open(AcMapTopology::eForRead);
 // Another test: Confirm that the topology has the correct nodes.
 AcMapNodePtrArray apNodes;
 if (AcMap::kOk == pTopology->GetNodes(apNodes))
 {

  // Verify the nodes....
  apNodes.Empty();

 }
 else
 {
 // Cannot get nodes - handle the error.
 }

}
else
{

 // Cannot create topology - handle the error.

}
// Clean up.
pTopology->Close();
delete pTopology;
pTopology = NULL;
```

Managing Topology Properties

AcMapTopologyAcMapTopologyManagerAcMapTopologySource

- Completeness - IsComplete()
- Description - GetDescription()/SetDescription()
- Error-marker styles - GetMarkerStyles(). See also AcMapMarkerStyles class.
- Highlighting - ShowGeometry()
- Loaded or unloaded - IsLoaded()
- Name - GetName()/Rename()
- Scope - GetTopologyScope(). See also ETopologyScope enum.
- Source - GetTopologySource()/GetSource()
- Status - GetStatus(). See also EStatus enum.
- Type - GetType()/IsFixedType()/IsLinearType()/IsLogicalType()/IsPointType()/I See also ETopologyType enum.

Note GetTopologySource() takes topology source information as AcMapTopologySource instances in the array `typedef AcArray< AcMapTopologySource > AcMapTopologySourceArray`.

For topology source-code samples, see Topology Samples.

```
// Rename a topology.
AcMap::EErrCode errCode;
const char* pszTopologyName = "MyTopology";
const char* pszNewTopologyName = "MyRenamedTopology";
errCode = AcMapTopologyManager::Rename(pszTopologyName, pszNewTopo
if (AcMap::kOk == errCode)
{

 // Process the renamed topology.
 // Perhaps inspect and change its description.
 ...
}
```

```
else if (AcMap::kErrTopInvalidName == errCode)
{

  // Handle the bad topology name. A bad name typically is
  // NULL, empty, too long, or has nonalphabetic characters.

}
else if (AcMap::kErrTopNotExist == errCode)
{

  // The given topology doesn't exist.

}
else
{

  // Handle a different type of error.

}
```

Adding, Editing, and Deleting Topology Elements

AcMapTopologyAcMapTopoFullEdgeAcMapTopoNodeAcMapTopoPolygon

- Add a curve (linear object) - AddCurveObject()
- Add a point - AddPointObject()
- Add polygon edges - AddPolygons()
- Delete a node - DeleteNode() (two forms)
- Delete a polygon - DeletePolygon() (two forms)
- Delete an edge - DeleteEdge()
- Merge many neighboring polygons - MergePolygons() (two forms)
- Merge two neighboring polygons - MergePolygons() (two forms)
- Move a node - MoveNode() (two forms)
- Split a polygon - SplitPolygon() (two forms)

For topology source-code samples, see Topology Samples.

```
// Move a node in a topology.
AcMap::EErrCode errCode;
const char* pszTopologyName = "MyNodeTopology";
AcMapTopology* pTopology = new AcMapTopology(pszTopologyName);
// Open the topology for write.
if (AcMap::kOk == pTopology->Open(AcMapTopology::eForWrite))
{

 // Get the node of interest (with object ID = 4, in this case)
 // and move it to a new location.
 AcMapTopoNode* pNode = NULL;
 pTopology->GetNode(pNode, 4);
 AcGePoint3d newLocation(39.0, 15.0, 0.0000);
 if (AcMap::kOk != pTopology->MoveNode(*pNode, newLocation))
 {

  // Handle the error.

 }
 delete pNode;
 pTopology->Close();

}
else
{

 // Cannot open topology - handle the error.

}
```

Querying Topologies

AcMapTopologyAcMapTopoFullEdgeAcMapTopoNodeAcMapTopoPolygon

- Specific edge - FindEdge()
- Edge nearest a point - FindEdge()
- Edge, node, or polygon nearest a point - FindTopologyObject(). See also AcMapTopoElement class.
- Node nearest a point - FindNode()
- Polygon containing a point - FindPolygon()
- Polygons neighboring a curve - FindNeighborPolygons(). See also

Arrays of Topology Elements.

For topology source-code samples, see Topology Samples.

```
// Find a polygon in a topology.
AcMap::EErrCode errCode;
const char* pszTopologyName = "MyPolygonTopology";
AcMapTopology* pTopology= new AcMapTopology(pszTopologyName);
// Open the topology from the source drawing for read.
if (AcMap::kOk == pTopology->Open(AcMapTopology::eForRead, true, f
{

 // Find the polygon containing a specific point.
 AcMapTopoPolygon* pPolygon;
 AcGePoint3d point(30.0, 12.0, 0.0000);
 errCode = pTopology->FindPolygon(pPolygon, point);
 if (AcMap::kOk == errCode)
 {

  // Is this a polygon of interest (with object ID = 184, in this
  if (pPolygon->GetID() == 184)
  {

   // Process the polygon.

  }

 }
 else
 {

  // FindPolygon() failed - handle the error.

 }
 // Clean up.
 delete pPolygon;
 pPolygon = NULL;
 pTopology->Close();

}
else
{

 // Failed to open topology - handle the error.

}
```

Retrieving Topology Elements

AcMapTopologyAcMapTopoFullEdgeAcMapTopoHalfEdgeAcMapTopoNodeAc

- All AutoCAD entities - GetEntityIds()
- All full edges - GetFullEdges(). See also Arrays of Topology Elements.
- All nodes - GetNodes(). See also Arrays of Topology Elements.
- All polygons - GetPolygons(). See also Arrays of Topology Elements.
- Specific AutoCAD entity - GetEntityId()
- Specific full edge - GetFullEdge()
- Specific half edge - GetBackwardEdge()/GetForwardEdge()
- Specific node - GetNode()
- Specific polygon - GetPolygon()

For topology source-code samples, see Topology Samples.

```
// Get the nodes of a topology.
AcMap::EErrCode errCode;
const char* pszTopologyName = "MyNodeTopology";
AcMapTopology* pTopology = new AcMapTopology(pszTopologyName);
AcMapNodePtrArray apNodes;
// Open the topology for read.
if (AcMap::kOk != pTopology->Open(AcMapTopology::eForRead, true, f
{

 // Failed to open topology - handle the error.

}
if (Acad::eOk == pTopology->GetNodes(apNodes))
{

 // Process each node.
 for (int i = 0; i < apNodes.length(); i++)
 {

  // Get the node location.
  AcGePoint3d point;
  errCode = apNodes[i]->GetLocation(point);
  if(Acad::eOk == errCode)
```

```
    {

     // Process the node.

    }

   }

  }
  else
  {

   // GetNodes() failed - handle the error.

  }
  // Clean up.
  apNodes.Empty();
  pTopology->Close();
```

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Managing Topology Elements

AcMapTopology

- Full edges - AcMapTopoFullEdge instances (derived from AcMapTopoElement)
- Associated AutoCAD entity - GetEntity()
- Associated polygon - GetPolygon(). See also AcMapTopoPolygon class.
- Associated ring - GetRing(). See also AcMapTopoRing class.
- Associated topology - GetTopology(). See also AcMapTopology class.
- Coincident or nearby point - IsOnThisObject()
- Edge direction - GetDirection()/SetDirection(). See also EDirection enum.
- Edge length - GetLength()
- Edge resistance - GetResistance()/SetResistance()
- Next edge - GetNextEdge()
- Next node - GetNextNode()

- Traversing half edge - GetHalfEdge()
- Unique identifier - GetID()
- Half edges - AcMapTopoHalfEdge instances
- Associated polygon - GetPolygon(). See also AcMapTopoPolygon class.
- Associated ring - GetRing(). See also AcMapTopoRing class.
- Associated topology - GetTopology(). See also AcMapTopology class.
- Containing full edge - GetFullEdge()
- Edge resistance - GetResistance()/SetResistance()
- Next edge - GetNextEdge()
- Next/previous node - GetNextNode()/GetPreviousNode()
- Nodes - AcMapTopoNode instances (derived from AcMapTopoElement)
- Associated AutoCAD entity - GetEntity()
- Associated topology - GetTopology(). See also AcMapTopology class.
- Coincident or nearby point - IsOnThisObject()
- Edges - GetEdges(). See also AcMapTopoHalfEdge class and Arrays of Topology Elements.
- Next edge - GetNextEdge() (two forms). See also AcMapTopoFullEdge and AcMapTopoHalfEdge classes.
- Node location - GetLocation()/SetLocation()
- Node mobility - IsMoveable()/SetIsMoveable()
- Node resistance - GetResistance()/SetResistance()
- Unique identifier - GetID()
- Polygons - AcMapTopoPolygon instances (derived from AcMapTopoElement)
- Associated AutoCAD entity - GetEntity()
- Associated topology - GetTopology(). See also AcMapTopology class.

- Coincident or nearby point - IsOnThisObject()
- Hierarchical parent/children polygons - GetHierParent()/GetHierChildren()
- Multi-polygon parent - GetParent()
- Polygon area - GetArea()
- Polygon boundary - GetBoundary(). See also Arrays of Topology Elements.
- Polygon centroid - GetCentroid()
- Polygon perimeter - GetPerimeter()
- Traversal to neighboring polygon - Traverse()
- Unique identifier - GetID()
- Rings - AcMapTopoRing instances
- Constituent edges - GetEdges(). See also AcMapTopoHalfEdge class and Arrays of Topology Elements.
- First edge - GetStartEdge(). See also AcMapTopoHalfEdge class.
- Outer polygon boundary - IsExterior(). See also AcMapTopoPolygon::GetBoundary().
- Ring area - GetArea()
- Ring length - GetLength()

For topology source-code samples, see Topology Samples.

```
// Get a specific polygon from a topology and print
// statistics for its rings.
AcMap::EErrCode errCode;
char* pszTopologyName = "MyTopology";
AcMapTopology* pMapTopology = NULL;
// Open the topology for read.
if (AcMapTopologyManager::TopologyExists(pszTopologyName))
{

 pMapTopology = new AcMapTopology(pszTopologyName);
```

```
   if(AcMap::kOk != pMapTopology->Open(AcMapTopology::eForRead))
   {
   // Cannot open topology - handle the error.
   }

  }
  // Get a polygon of interest (with object ID = 10, in this case)
  // and retrieve its rings with GetBoundary().
  AcMapTopoPolygon* pPolygon = NULL;
  if (AcMap::kOk == pTopology->GetPolygon(pPolygon, 10))
  {

   // Get the polygon's rings.
   AcMapRingPtrArray apRings;
   errCode = pPolygon->GetBoundary(apRings);
   if (AcMap::kOk == errCode)
   {

    // Get statistics for each ring.
    int nRings = apRings.length(); // Number of rings.
    for (int nRingIndex = 0; nRingIndex < nRings; nRingIndex++)
    {

     AcMapTopoRing* pRing = apRings[nRingIndex];
     // Is ring exterior or interior?.
     char* pszExtOrInt = pRing->IsExterior() ? "exterior" : "interi
     // Print the rings' area and length.
     acutPrintf("\n#%d is %10s, Area: %-0.4lf Length: %-0.4lf",
     (nRingIndex + 1), pszExtOrInt, pRing->GetArea(), pRing->GetLen

    }
    apRings.Empty(); // Free the array of rings.

   }
   else
   {

    // Cannot get the polygon's boundary - handle the error.

   }

  }
  else
  {

   // Cannot get the specified polygon - handle the error.

  }
  // Clean up.
  delete pPolygon;
  pPolygon = NULL;
```

```
pMapTopology->Close();
```

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<a id="analyzing">Analyzing Topologies

- Shortest-path trace - A shortest-path trace uses a network topology to calculate the shortest path between two points or determine the optimal route based on values of direction and resistance. In a street network, for example, you can find the shortest path between a fire station and a school. Use TraceLeastCostPath() to calculate a shortest-path trace and an AcMapTraceParameters instance to set trace parameters.

- Best-route trace - A best-route trace uses a network topology to calculate the best route from a starting point to an end point, with one or more intermediate points. AutoCAD Map 3D determines the optimal route based on values of direction and resistance. In a street network, for example, you can find the best route to travel when visiting several customer sites from a hotel. Use TraceBestPath() to calculate a best-route trace and an AcMapTraceParameters instance to set trace parameters.

- Flood trace - A network flood trace traces out from a point in all directions, given the point where the network starts and the maximum distance that the network can traverse. A flood trace determines how many links and nodes can be traveled before the accumulated resistance exceeds the specified maximum resistance. You can find all restaurants within a 10-minute walk of a hotel, for example, or check the integrity of a network topology (if some links are not flooded, the topology is incomplete). Use TraceFlood() to calculate a flood trace and an AcMapFloodParameters instance to set trace parameters.

- Buffering a topology - Buffer analysis, or buffering, identifies objects within a specified offset of elements in node, network, and polygon topologies. A buffer is a zone that is drawn around a topology. You can specify a buffer on either side of a river to show the extent of a flood plain, for example. Use Buffer() to create a new topology with a buffer setting.

- Dissolving a composite topology - If a topology contains many smaller polygons, you can create a new topology by combining polygons that share the same data value in a specified field, called the dissolve field, which can be an object-data field or a column in a linked external database. Use Dissolve() to dissolve a topology.

- Overlaying topologies - Overlay analysis lets you overlay topologies that are loaded into the current drawing. The three types of overlay analysis are nodes with polygons, networks with polygons, and polygons with polygons. When you overlay two topologies, you choose the method in which the two selected topologies interact. In some cases, the result varies according to which topology is the source and which is the overlay. You have the following overlay options:

- Clip() - A clip operation uses the overlay polygon topology as a boundary. The parts of the source polygons outside the overlay polygons are clipped and discarded. You can use this option to show polygons within a boundary polygon, such as a city or state boundary.

- Erase() - An erase operation uses the overlay polygon topology like a mask and erases everything in the source polygon topology that is covered by the overlay topology.

- Identity() - An identity operation works like Union() on the source topology and like Intersect() on the overlay topology. Use Identity() to combine nodes, links, or polygons with polygons and keep all the input geometry. Identity() creates one topology with one link where the link is crossed by the overlay topology.

- Intersect() - An intersect operation combines topologies and keeps only the common geometry. Intersect() acts like the Boolean AND operation. The results are the same whichever topology is chosen as the first or second. Object data is combined for the two operations.

- Paste() - A paste operation pastes the overlay polygon topology on top of the source polygons. The source polygons not covered by the overlay remain. Paste() can be used with only polygons.

- Union() - A union operation combines polygons with polygons and keeps all geometry. Union() acts like the Boolean OR operation and can be used with only polygons. You can combine parcels with soils information for property assessment, for example. Use Union() to maintain both sets of geometry together and pull them apart as needed.

- The overlay functions all take source and overlay data as AcMapTopoOverlayData instances in the array `typedef AcArray< AcMapTopoOverlayData > AcMapOverlayDataArray`.

Note Before creating new topologies by buffering or overlaying existing topologies, you can call SetCentroidCreationSettings(), SetEdgeCreationSettings(), and SetNodeCreationSettings() to override the default topology-creation values.

For topology source-code samples, see Topology Samples.

```
// Two topologies are needed: source and overlay.
const char* pszSourceTopologyName = "MyNodeTopology";
AcMapTopology* pSourceTopology = new AcMapTopology(pszSourceTopolo
const char* pszOverlayTopologyName = "MyPolygonTopology";
AcMapTopology* pOverlayTopology = new AcMapTopology(pszOverlayTopo
AcMap::EErrCode errCode;
// Open both source and overlay topologies for read.
if(AcMap::kOk == pSourceTopology->Open(AcMapTopology::eForRead))
{

 if(AcMap::kOk == pOverlayTopology->Open(AcMapTopology::eForRead)
 {

  // Create the intersection of the source and overlay topologies
  errCode = pSourceTopology->Intersect(pOverlayTopology, "OutputTo
  if(AcMap::kOk == errCode)
  {

   // Process the topology intersection.

  }

 else
 {

  // Cannot create topology intersection - handle the error.

 }
 pOverlayTopology->Close();

}
else
{

 // Cannot open overlay topology - handle the error.
}
pSourceTopology->Close();
}
else
{

 // Cannot open source topology - handle the error.

}
```

Using Iterators

AcMapTopoIteratorAcMapTopology

- Count the number of topologies - Count()
- Last-element flag - IsDone()
- Move to first/next element - First()/Next()
- Current topology - GetTopology()
- Current topology's name - GetName()
- Current topology's description - GetDescription()
- Current topology's type - GetType()

For topology source-code samples, see Topology Samples.

```
AcMap::EErrCode errCode;
// Initialize the iterator.
AcMapTopoIterator* pIterator = new AcMapTopoIterator;
AcMapTopology* pTopology = NULL;
// Iterate through the topology objects.
pIterator->First();
while (!pIterator->IsDone())
{

 pIterator->GetTopology(pTopology);
 // Process the topology...
 errCode = pIterator->Next();

}
delete pIterator;
delete pTopology;
```

```
  // To iterate with a for-loop:
  // for (pIterator.First(); !pIterator.IsDone(); pIterator.Next())
```

Arrays of Topology Elements

AcMapTopoElementPtrArray

Array class	Holds pointers to
AcMapFullEdgePtrArray	AcMapTopoFullEdge instances
AcMapHalfEdgePtrArray	AcMapTopoHalfEdge instances
AcMapNodePtrArray	AcMapTopoNode instances
AcMapObjectPtrArray	AcMapTopoElement instances
AcMapPolygonPtrArray	AcMapTopoPolygon instances
AcMapRingPtrArray	AcMapTopoRing instances

For topology source-code samples, see Topology Samples.

Handling Errors

Many functions in the various topology classes return an AcMap::EErrCode error code. When a particular function returns an error code, read that function's documentation for function-specific error conditions rather than relying on only the generic error descriptions in the AcMap::EErrCode documentation.

Other Information Sources

- For more information about topology in AutoCAD Map 3D, choose Help &gt; AutoCAD Map 3D Help &gt; Contents tab (or press F1), and then navigate to Using AutoCAD Map 3D (by feature) &gt; Topology (Spatial Analysis).

- For a topology tutorial in AutoCAD Map 3D, choose Help &gt; Tutorials &gt; Contents tab, and then choose "Using Topology and Spatial Analysis".
- For information about object data in AutoCAD Map 3D, choose Help &gt; AutoCAD Map 3D Help &gt; Contents tab (or press F1), and then navigate to Using AutoCAD Map 3D (by feature) &gt; Object Data.

Topology Samples

To view code samples of topology functions, open the Samples folder in your AutoCAD Map 3D ObjectARX installation and navigate to Map Samples\Topology.

Topology Classes, Namespaces, and Globals

To view the topology classes, namespaces, and globals, click the following links:

AcMapTopology Class

AcMapTopoElement Class

AcMapTopoFullEdge Class

AcMapTopoHalfEdge Class

AcMapTopoNode Class

AcMapTopoPolygon Class

AcMapTopoRing Class

AcMapTopoIterator

AcMapTopologySource Class

AcMapTopoOverlayData Class

AcMapEntityCreationSettings Class

AcMapPointCreationSettings Class

AcMapFloodParameters Class

AcMapTraceParameters Class

AcMapNetAnalysisParameters Class

AcMapMarkerStyles Class

AcMapTopoElementPtrArray Template Class

AcMapObjectPtrArray Class

AcMapFullEdgePtrArray Class

AcMapHalfEdgePtrArray Class

AcMapNodePtrArray Class

AcMapPolygonPtrArray Class

AcMapRingPtrArray Class

AcMapTopologyManager Namespace

AcMapObjectDataField Global Struct

AcMapObjectDataTable Global Struct

ETopologyMarkType Global Enum

ETopologyType Global Enum

Centroids

Creating centroids moves attached data from the perimeters of mpolygons and closed polylines to their centroids so that the data is not lost when topologies are created.

Topics in this section

Creating Centroids

You must create centroids for mpolygons and closed polylines before building a topology with them.

A closed polyline is a polygon produced by the POLYGON command.

Creating Centroids

Use the CreateCentroids() (twoforms) functions in the AcMapUtilities namespace to create centroids.

For centroid-creation source-code samples, see Creating Centroids Samples.

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Other Information Sources

- For more information about creating centroids in AutoCAD Map 3D, choose Help &gt; Autodesk Map Help &gt; Contents tab (or press F1), and then navigate to Using AutoCAD Map 3D (by feature) &gt; Topology (Spatial Analysis) &gt; Editing Topologies &gt; Creating Centroids for Polygons.

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Creating Centroids Samples

To view code samples of centroid-creation functions, open the Samples folder in your AutoCAD Map 3D ObjectARX installation and navigate to Map

Samples\CreateCentroid.

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Creating Centroids Namespace

To view the centroid-creation namespace, click the following link:

AcMapUtilities Namespace

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Drawing Cleanup

You must clean drawing objects before building a topology with them.

Topics in this section

- Drawing Cleanup Details

Drawing Cleanup Details

Let's look at this in two phases, preparing the cleanup model, which ends with a call to tpm_cleaninit, and executing the cleanup, which begins with a call to tpm_cleanstart.

To prepare the cleanup model

1. Allocate memory for the cleanup model. Use tpm_cleanalloc.

   ```
   ade_id cleanupModelId = tpm_cleanalloc();
   ```

2. Allocate memory for cleanup variables, which specify properties for the cleanup process. The variables are initialized to their default values. Use tpm_varalloc.

   ```
   ade_id cleanupVarId = tpm_varalloc();
   ```

   If you will be specifying an explicit list of cleanup actions (you create and manage this list with calls to tpm_cleanactionlistins and related functions), also allocate memory for cleanup action variables, which specify properties for individual actions. Again use tpm_varalloc.

   ```
   ade_id cleanupActionVarId = tpm_varalloc();
   ```

3. Get a selection set of objects to be cleaned (the *include* set).

   ```
    ads_name ssObjsForCleanup;
    acutPrintf("\nSelect the objects to perform cleanup on.");
    acedSSGet(NULL, NULL, NULL, NULL, ssObjsForCleanup);
   ```

   Or create one.

```
struct resbuf* pFilteredEntitySelectionRb = acutBuildList(
RTDXF0, "LWPOLYLINE",
8, "UtilityNetwork-Electric",
0);
ads_name ssObjsForCleanup;
acedSSGet("X", NULL, NULL, pFilteredEntitySelectionRb, ssOb
acutRelRb(pFilteredEntitySelectionRb);
```

You can also get a selection set of objects to be anchored (the *anchor* set). Anchored objects are not repositioned by the cleanup process, but remain fixed while others are repositioned around them.

```
ads_name ssObjsToAnchor;
acutPrintf("\nSelect the objects to serve as an anchor.");
acedSSGet(NULL, NULL, NULL, NULL, ssObjsToAnchor);
```

The acedSSGet function prompts the user to select objects and returns a selection set. This function can also be used with a resbuf to filter selected objects. Make sure to release selection sets when finished with them, using acedSSFree()

4. Set cleanup variables using tpm_varset with the clean_var_id that you allocated in step 2. A few of these variables specify cleanup actions, but most of them specify how cleanup actions will be performed.

```
// Set the cleanup variable "LINK_ERROR" for break crossing
char* pszConfigVarName = "LINK_ERROR";
struct resbuf* pLinkErrorVarValRb = acutBuildList(
RTSHORT, 2,
0);
int resultCode = tpm_varset(
cleanupVarId,
pszConfigVarName,
pLinkErrorVarValRb);
acutRelRb(pLinkErrorVarValRb);
// Set the cleanup variable "INCLUDEOBJS_AUTOSELECT".
// Must be included with a filtered selection set.
pszConfigVarName = "INCLUDEOBJS_AUTOSELECT";
struct resbuf* pIncludeObjsVarValRb = acutBuildList(
RTSHORT, 0,
0);
```

```
resultCode = tpm_varset(
cleanupVarId,
pszConfigVarName,
pIncludeObjsVarValRb);
acutRelRb(pIncludeObjsVarValRb);
// Set the cleanup variable "INCLUDEOBJS_LAYERS".
// Must be included with a filtered selection set.
pszConfigVarName = "INCLUDEOBJS_LAYERS";
struct resbuf* pIncludeObjsLyrVarValRb = acutBuildList(
RTSTR, "UtilityNetwork-Electric",
0);
resultCode = tpm_varset(
cleanupVarId,
pszConfigVarName,
pIncludeObjsLyrVarValRb);
acutRelRb(pIncludeObjsLyrVarValRb);
```

Before setting cleanup variables, you can load a cleanup profile if you saved one previously, and in that way set many variables at once. Use tpm_cleanprofileload.

```
resultCode = tpm_cleanprofileload(
cleanupVarId,
"C:\\profile.dpf");
```

If you specify an explicit list of cleanup actions, note that those will be the only actions performed. Cleanup actions specified by the variables NODE_ERROR, LINK_ERROR, and GENERALIZE will be ignored, as well as any setting specific to them only, such as CORRIDOR's, which defines the tolerance for GENERALIZE.

Using an action list is the best way to specify cleanup actions, because you can specify the order in which they execute, and you can include the same action more than once. Using variables to specify cleanup actions is an older technique, which is still supported for the sake of older scripts, but it is deprecated from AutoCAD Map 3D 6 onward.

Note When you insert the Simplify Objects action (clean group type 128), it is always listed first, and you cannot insert it more than once.

With an explicit list of cleanup actions, note that certain individual actions can have individual tolerance settings (and in some cases, other settings also). See Cleanup Action Variables. When you are about to insert an action into the action list, you can use tpm_varset with the action_var_id that you allocated in step 2 to set variables for this action before calling tpm_cleanactionlistins. You can continually reset and reuse the same set of cleanup action variables with each action that you insert.

```
// Set CLEAN_TOL cleanup variable for simplify objects,(wee
pszConfigVarName = "CLEAN_TOL";
struct resbuf* pCleanTolVarValRb = acutBuildList(
RTREAL, 2.0,
0);
resultCode = tpm_varset(
cleanupActionVarId,
pszConfigVarName,
pCleanTolVarValRb);
acutRelRb(pCleanTolVarValRb);
```

Insert a cleanup action for simplify objects by specifying the cleanup variables id (real) returned by tpm_cleanalloc(), the index at which the item will be inserted into the list, the clean group type code, (see tpm_cleangrouptype for a list of types) and the cleanup action variable id (real) returned by tpm_varalloc().

```
resultCode = tpm_cleanactionlistins(
cleanupVarId,
0,
128,
cleanupActionVarId);
```

Insert an additional cleanup action for break crossing objects. The index position of -1 is for the last position.

```
resultCode = tpm_cleanactionlistins(
cleanupVarId,
-1,
2,
cleanupActionVarId);
```

At any point while you are setting cleanup variables, or after you have finished, you can save the current cleanup profile using tpm_cleanprofilesave.

```
resultCode = tpm_cleanprofilesave(
cleanupVarId,
"C:\\profile.dpf");
```

Note that saved profiles are XML files. You can view or edit them in a text editor as you can with saved queries (which are AutoLISP scripts). See Editing Query Files.

5. Call tpm_cleaninit to add cleanup variables and the selection set of objects to clean to the cleanup model.

```
resultCode = tpm_cleaninit(
cleanupModelId,
cleanupVarId,
ssObjsForCleanup);
```

If you have collected a selection set of objects to be anchored, first call tpm_cleaninitanchorset before calling tpm_cleaninit.

```
resultCode = tpm_cleaninitanchorset(
cleanupModelId,
cleanupVarId,
ssObjsForAnchor);
```

The cleanup model is now complete.

To execute the cleanup

1. Begin the cleanup process with tpm_cleanstart.

```
resultCode = tpm_cleanstart(cleanupModelId);
```

2. Execute cleanup actions (process cleanup groups) until cleanup is complete. With each cleanup group, with each error, mark and fix it.

```
resultCode = tpm_cleangroupnext(cleanupModelId);
```

```
 if (resultCode == RTNORM){

  while (! (tpm_cleancomplete(cleanupModelId))){

   long lCleanErrors = 0;
   tpm_cleangroupqty(cleanupModelId, &lCleanErrors);
   for (int i = 0; i < lCleanErrors; i++){
   resultCode = tpm_cleanerrorcur(cleanupModelId, i);
   resultCode = tpm_cleanerrormark(cleanupModelId);
   resultCode = tpm_cleanerrorfix(cleanupModelId);
   }
   resultCode = tpm_cleangroupnext(cleanupModelId);

  }

 }
 else {

  acutPrintf("\nNothing to clean.");

 }
```

3. Update the drawing with tpm_cleanend.

   ```
   resultCode = tpm_cleanend(cleanupModelId);
   ```

   Optional, To clear the cleanup model without updating the drawing, use tpm_cleancancel.

   ```
   resultCode = tpm_cleancancel(cleanupModelId);
   ```

4. Free the cleanup model.

   ```
   resultCode = tpm_cleanfree(cleanupModelId);
   ```

5. Free the selection set.

   ```
   resultCode = acedSSFree(ssObjsForCleanup);
   ```

Annotation

Use AutoCAD Map's annotation feature to indicate textual values on a drawing object.

These textual values might be attributes (such as object data), display properties (such as a lineweight), or geometric values (such as the line direction). In addition, you can add graphics, such as arrows, static text, or other geometry, to your annotation by using standard AutoCAD drawing commands. Annotation functions are available in the AcMapAnnotationManager namespace. See also Other Information Sources.

Topics in this section

- Annotation Details

Annotation Details

Use AutoCAD Map 3D's annotation feature to indicate textual values on a drawing object.

Creating Annotation Templates

Before you can add annotation to a drawing, you first must call CreateAnnotationTemplate() to define an annotation template that specifies what information will be included and how it will be displayed. Call AnnotationTemplateExists() to check whether a specific template already exists; if it does exist, CreateAnnotationTemplate() won't overwrite it, but rather will return a null object ID.

For annotation source-code samples, see Annotation Samples.

```
char* pszTemplateName = "MyAnnotationTemplate";
AcDbObjectId idCreatedAnnTem;
if(!AnnotationTemplateExists(pszTemplateName))
```

```
  {

   // Create a template with the name stored in pszTemplateName.
   idCreatedAnnTem = CreateAnnotationTemplate(pszTemplateName);
   // Test whether the template's object ID is valid.
   if(idCreatedAnnTem != AcDbObjectId::kNull)
   {
   }

  }
```

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Setting Annotation Template Properties

After creating an annotation template, you can retrieve or set its following static properties:

- Color - GetTemplateColor()/SetTemplateColor()
- Layer - GetTemplateLayer()/SetTemplateLayer()
- Linetype - GetTemplateLinetype()/SetTemplateLinetype()
- Lineweight - GetTemplateLineWeight()/SetTemplateLineWeight()
- Rotation - GetTemplateRotation()/SetTemplateRotation()
- Scale factor - GetTemplateScaleFactor()/SetTemplateScaleFactor()

For annotation source-code samples, see Annotation Samples.

```
Acad::ErrorStatus acErrStatus;
char* pszTemplateName = "MyAnnotationTemplate";
AcCmColor acclrInColor;
char* pszInLayerName = "aLayer";
// Set a few template properties.
acErrStatus = SetTemplateScaleFactor(pszTemplateName, 2.0);
acErrStatus = SetTemplateRotation(pszTemplateName, PI); // PI radi
acclrInColor.setColorIndex(1); // Red.
acErrStatus = SetTemplateColor(pszTemplateName, acclrInColor);
acErrStatus = SetTemplateLayer(pszTemplateName, pszInLayerName);
// Get the scale factor.
double dOutScaleFactor;
acErrStatus = GetTemplateScaleFactor(dOutScaleFactor, pszTemplateN
```

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Setting Annotation Text and Expressions

To set the text that appears on an annotation, call CreateAnnotationText() to create a text object and set its properties (tag, height, color, justification, and so on), and then call SetExpressionString() to set the value that appears. The expression can be any valid combination of functions and variables that can appear in the AutoCAD Map 3D Expression Evaluator.One form of SetExpressionString() takes a char* expression, and the other form takes an AcMapExpression expression. To retrieve an expression, call GetExpressionString(). GetExpressionString() and SetExpressionString() take an eAnnotationExpressionFields argument that indicates which expression to retrieve or store. Use IsAnnotationText() to determine whether a particular attribute definition is an annotation text entity.

For annotation source-code samples, see Annotation Samples.

```
#include dbmain.h // Needed for acdbOpenObject().
Acad::ErrorStatus acErrStatus;
// idCreatedAnnTem was created earlier with CreateAnnotationTempla
AcDbObjectId idTagText;
acErrStatus = CreateAnnotationText(idTagText, idCreatedAnnTem);
// Open the newly created text object for write.
AcDbAttributeDefinition* pTagText = NULL;
acErrStatus = acdbOpenObject((AcDbObject *&)pTagText, idTagText, A
// Check if this is an annotation text object.
if (IsAnnotationText(pTagText))
{

 // Set a few properties for the text object.
 pTagText->setTag("Area"); // Always set the tag attribute.
 pTagText->setPosition(AcGePoint3d(0.0,0.0,0.0));
 pTagText->setHeight(0.5);
 pTagText->setVerticalMode(AcDb::TextVertMode::kTextVertMid);
 pTagText->setHorizontalMode(AcDb::TextHorzMode::kTextCenter);
 // Set the value of the expression to display
 // the area of the associated entity.
 char* pszExpressionString = ".AREA";
 // Store the expression with the annotation text object.
 acErrStatus = SetExpressionString(kpszExpressionString, pTagText,

}
```

```
// Print the value of the expression that we just set.
char* pszOutExpression = NULL;
acErrStatus = GetExpressionString(pchOutExpression, pTagText, kAtt
if (acErrStatus == Acad::eOk)
{

 acutPrintf("Tag = %s. Expression string = %s\n", pTagText->tag(),
 acutDelString(pchOutExpression);

}
```

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Inserting Annotation References

Call InsertAnnotationReference() to attach an annotation reference to a particular entity. Optionally, you can override the default property values of the base annotation template when you insert a new annotation reference: One form of InsertAnnotationReference() uses the property values of an existing annotation reference to set the values of the new reference, and the other form lets you specify an AnnotationOverrides struct of explicit override values. To attach an annotation reference to more than one entity, call InsertAnnotationReferences() (which also supports property overrides).

For annotation source-code samples, see Annotation Samples.

```
AcDbObjectId idNewBlkRefId; // Output object ID of the newly creat
char* pszTemplateName = "MyAnnotationTemplate"; // Name of existin
AcDbObjectId idAssocEnt; // Object ID of entity to attach annotati
Acad::ErrorStatus acErrStatus;
// Draw a circle to associate the annotation with.
AcGePoint3d ptCenter(0,0,0);
AcGeVector3d vcNorm(0,0,1);
double dInRadius = 5.5;
idAssocEnt = DrawCircle(ptCenter, vcNorm, dInRadius);
// Attach the annotation reference to the circle.
// The annotation will appear in the current drawing
// if its annotation text expression(s) can be evaluated.
// The MyAnnotationTemplate text expression is set to .AREA.
acErrStatus = InsertAnnotationReference(idNewBlkRefId, pszTemplate
// Test to see if the insertion succeeded.
if(acErrStatus != Acad::eOk)
{
 // Handle the error...
}
```

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Updating Annotations

If an entity associated with an annotation reference changes, call RefreshAnnotationReferences() to refresh the annotation. If an annotation template changes, call UpdateAnnotationReferences() to update the annotation references based on that template. Both functions let you control how the annotation reference's property values are updated.

For annotation source-code samples, see Annotation Samples.

```
 char* pszTemplateName = "MyAnnotationTemplate"; // Name of existir
 bool bFullAnnotation;
 bool bRetainLocal;
 Acad::ErrorStatus acErrStatus;
 bFullAnnotation = false; // Re-evaluate only the text string - dor
 acErrStatus = RefreshAnnotationReferences(pszTemplateName, bFullAr
 bRetainLocal = true; // Don't discard the local property values.
 acErrStatus = UpdateAnnotationReferences(pszTemplateName, bRetainL
 // Test to see if the update succeeded.
 if(acErrStatus != Acad::eOk)
 {

  // Handle the error...

 }
```

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Deleting Annotations

To delete an annotation template, call DeleteAnnotationTemplate(). You can delete only templates with no annotation references, which you can check with IsAnnotationTemplateReferenced().AnnotationTemplateReferencedObjIds() lists all of a template's references, which you must delete before you can delete the template. Delete an annotation reference in the same way that you would delete any AutoCAD object.

For annotation source-code samples, see Annotation Samples.

```
#include dbmain.h // Needed for acdbOpenObject().
char* pszTemplateName = "MyAnnotationTemplate"; // Template to del
Acad::ErrorStatus acErrStatus;
if(AnnotationTemplateExists(pszTemplateName))
{

 // If the template has any annotation references, delete them.
 if(IsAnnotationTemplateReferenced(pszTemplateName))
 {
 AcDbObjectIdArray arrOutIdObjs;
 AcDbObject* pObj = NULL;
 if((AnnotationTemplateReferencedObjIds(arrOutIdObjs, pszTemplateN
 {
 // Open, erase, and close each returned object reference.
 while(arrOutIdObjs.length( ))
 {
 acErrStatus = acdbOpenObject(pObj, arrOutIdObjs.first( ), AcDb::k
 if((acErrStatus == Acad::eOk) && (pObj))
 {

  pObj->erase( );
  pObj->close( );
  pObj = NULL;
  // Remove the ID of the erased object.
  arrOutIdObjs.removeFirst( );

 }
 else
 {

  // Handle the error...

 }
 if((DeleteAnnotationTemplate(pszTemplateName)) != Acad::eOk)
 {

  // Handle the error...

 }

}
```

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Managing Annotations

You can use several general functions to manage annotation templates and references.GetTemplateNames() lists the annotation templates defined in the current drawing. Autodesk Map stores an annotation template as a block (AcDbBlockTableRecord) and an annotation reference as a block reference (AcDbBlockReference).

IsAnnotationTemplate() determines whether an AcDbBlockTableRecord is an annotation template and AnnotationTemplateBlockDefinitionId() gets a template's AcDbBlockTableRecord.

IsAnnotationBlockReference() determines whether a AcDbBlockReference is an annotation reference;AnnotationBlockReferenceAssociatedObjectId() returns the ID of the object associated with a specific annotation reference; and TemplateNameBTRPrefix() returns the special prefix string ("ACMAP_ANN_TEMPLATE_") that Autodesk Map silently prepends to each annotation template name.

For annotation source-code samples, see Annotation Samples.

```
// Get all the annotation template names.
Acad::ErrorStatus acErrStatus;
AcArray<char*> acarrTemNameArray;
acErrStatus = GetTemplateNames(acarrTemNameArray);
if((acErrStatus == Acad::eOk) && (!(acarrTemNameArray.isEmpty( )))
{

 // Process the templates...

}
```

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Other Information Sources

- For more information about annotation in AutoCAD Map 3D, choose Help &gt; Autodesk Map Help &gt; Contents tab (or press F1), and then navigate to Using AutoCAD Map 3D (by feature) &gt; Annotation.
- For an annotation tutorial in AutoCAD Map 3D, choose Help &gt; Tutorials &gt; Contents tab, and then choose "Adding Annotations to

Objects".

- For more information about expressions in AutoCAD Map 3D, choose Help &gt; Autodesk Map Help &gt; Contents tab (or press F1), and then navigate to Expression Evaluator.

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Annotation Samples

To view code samples of annotation functions, open the Samples folder in your AutoCAD Map 3D ObjectARX installation and navigate to Map Samples\Annotation.

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Annotation Namespace

To view the annotation namespace, click the following link:

AcMapAnnotationManager Namespace

Display Manager

Manages the display of selected objects in a drawing for theming or highlighting.

For more information, see

- Display Manager in ObjectARX Reference Help.
- Display Manager sample code, which is located in the Map Samples\DisplayManagement folder of AutoCAD Map 3D ObjectARX installations.
- Display Manager in the UI documentation, AutoCAD Map 3D Help.

User Management

The AutoCAD Map 3D user-management feature provides user- and session-management tools for system administrators.

Topics in this section

User Management Detail

User Management

Other Information Sources

User Management SamplesUser Management Classes and Globals

User Management

The AcMapSession class provides the following user and session functions. The AcMapGetSession() global function retrieves the AutoCAD Map 3D session pointer, an instance of AcMapSession.

- Retrieve aliases - GetAliases()
- Retrieve error stack - GetErrorStack()
- Retrieve project iterator - GetProjectIterator()
- Log in a user - LogIn()
- List registered users - GetUserList()
- Retrieve the current user - GetCurrentUser()
- Retrieve/set a user's rights - GetUserRights()*/SetUserRights()*
- Lock/unlock Autodesk Map - Lock()/Unlock()
- Retrieve AutoCAD Map 3D ObjectARX API version - ArxApiVersion()
- Retrieve/set workspace rectangle - GetWSpaceRectangle()/SetWSpaceRectangle()
- Execute AutoCAD Map 3D command - InvokeCommand()
- Execute AutoCAD Map 3D API function - InvokeFunction()

- Retrieve AutoCAD Map 3D project - GetProject() (two forms)
- Retrieve AutoCAD document - GetDocument()
- Add/remove session reactor - AddSessionReactor()/RemoveSessionReactor()
- Add/remove options reactor - AddOptionsReactor()/RemoveOptionsReactor()
- Retrieve/set option values - GetOptionValue() (three forms: 1 2 3)/SetOptionValue() (three forms: 1 2 3)
- Option node test - IsOptionNodeEnabled()
- Set the Options dialog box active page - SetActiveOptionPage()
- Retrieve the users' root folder - getAllUsersRootFolder()
- Retrieve AutoCAD Map 3D application services - GetApplicationServices()
- Create a new user - CreateUser()*
- Delete an existing user - DeleteUser()*
- Change a user's password - ChangePassword()*
- Retrieve AutoCAD Map 3D project - GetProjectForDb()

For user-management source-code samples, see User Management Samples.

Other Information Sources

- For more information about user management in AutoCAD Map 3D, choose Help &gt; Autodesk Map Help &gt; Contents tab (or press F1), and then navigate to Using AutoCAD Map 3D (by feature) &gt; Setting Up AutoCAD Map 3D Drawings &gt; Setting Options &gt; Setting Up Users.

User Management Samples

To view code samples of user-management functions, open the Samples folder in your AutoCAD Map 3D ObjectARX installation and navigate to Map Samples\UserManager.

User Management Classes and Globals

To view the user-management classes and globals, click the following links:

AcMapSession ClassAcMapGetSession() Global Function

Map Plotting and Publishing

This topic describes plotting and publishing maps using Map Book classes.

Topics in this section

Map Plotting and Publishing Detail

Although the global-function API for map plotting remains in place, and existing code that is based on it is still valid, new development for plotting maps should use Map Book classes.

For more information, see

- Map Book in AutoCAD Map 3D ObjectARX Reference Help.
- Map Book sample code, which is located in the Map Samples\Plotting folder of Autodesk Map ObjectARX installations.
- Map Book in the UI documentation, AutoCAD Map 3D Help.

Managed Wrapper Classes

ObjectARX presented as managed C++.

Topics in this section

Managed Wrapper Classes Detail

The following discussion assumes that you are familiar with managed C++ and managed wrapper classes in AutoCAD ObjectARX. Refer to the managed wrapper sections in AutoCAD ObjectARX Help.

Get and Set Functions and Properties

If you are using C# or VB.NET to address the managed wrapper classes API, note that get_xx and set_xx functions are addressed as properties, and the property name is the xx part of the corresponding function names. If there are matching get_xx and set_xx functions, the property is read-write. If there is only a get_xx function, the property is read-only. In a few cases, where there is only a set_xx function, the property is write-only.

Option Strings Option Properties

Getting and setting project or session options is not the same with managed wrapper classes as it is with ObjectARX.

To get or set a session or project option using ObjectARX, use a GetOptionValue or SetOptionValue function. Specify the target option by passing the option name. For example, to set the log file name for a session (AcMapSession object, which corresponds to the MapApplication object, or the application, in managed wrapper context), you pass the option name and a file name:

```
pSession->SetOptionValue("LogFileName", "filename.ext");
```

To get or set the same option in managed wrapper context, first use the MapApplication::Options property to get the SystemOptions object, and then use an option-specific SystemOptions property:

```
oSysOptions.LogFileName = "filename.ext";
strLogFile = oSysOptions.LogFileName;
```

Getting Application and Project Objects

Autodesk Map objects are related in a containment hierarchy, with the Application object at the root. To access AutoCAD Map 3D objects, first get the Application object, and then use the Application::ActiveProject property to get the current project (a ProjectModel object).

```
NAMESPACE_MAP3D::MapApplication* mapApi = Autodesk::HostMapApplicat
NAMESPACE_MAP3D_PROJECT::ProjectModel* pProj = mapApi->ActiveProjec
```

With a project in hand, use ProjectModel properties to get objects that it contains. For example, its drawing set (DrawingSet object).

```
NAMESPACE_MAP3D_PROJECT::DrawingSet* pDSet = pProj->DrawingSet;
```

Sample Code

To get managed-wrapper samples, open MapSamples\DotNet in an AutoCAD Map 3D ObjectARX installation.

Notes, Tips, and Warnings

Topics in this section

Colors

Colors can be specified or returned as AutoCAD color indexes or true colors.

AutoCAD Color Indexes (ACIs)

The valid ACI formats are

Color Indexes, integer strings from 0 through 256. For example, "123". Note that indexes 0 and 256 do not specify colors literally, as 1 through 255 do, but logically. See "Logical Colors" below. And note that indexes 8 and 9 (a dark gray and a light gray), together with the named colors (see "Color Names" below), are collectively called the *standard colors*.

Color Names, which correspond to indexes 1 through 7. The color names are red, yellow, green, cyan, blue, magenta, and white. For example, "yellow" (always double-quoted). Note that index 7, the color named white, displays as white or black depending on background color.

Index	Name
1	Red
2	Yellow
3	Green
4	Cyan
5	Blue
6	Magenta
7	White

Logical Colors, which correspond to indexes 0 and 256. The logical colors are ByBlock (0) and ByLayer (256), and they reflect the current block and layer colors respectively. For example, "ByBlock" (always double-quoted). Note that

ByBlock and ByLayer can return true colors or ACIs.

For more information about ACIs,

1. In AutoCAD Map 3D, click Format > Color.
2. In the Select Color dialog box, click Help.

True Colors

By *true colors* we mean 24-bit color: three RGB components, 8 bits each, with no alpha component (that is, no transparency value).

The valid true-color formats are

RGB Triplets, where each component is an integer from 0 through 255. For example, "255,0,0". RGB triplets are wrapped in double quotes except when they are used in query conditions, in which case they must always be wrapped in escaped double quotes ('\"'). See "Color Patterns" below.

Color Book Colors, such as "Pantone, 123 CVC", a composite of two comma-separated names representing a Color Book and a color within it. Color book strings are wrapped in double quotes except when they are used in query conditions, in which case they must always be wrapped in escaped double quotes ('\"'). See "Color Patterns" below. And no matter where they are used, color book strings must always be wrapped in escaped double quotes if they contain certain special characters. If you are unsure if a color book string contains special characters, there is no harm wrapping it in escaped double quotes just to be sure.

Expressions, such as ".COLOR" or ".TRUECOLOR" (always double-quoted). ".COLOR" always returns an ACI color. If the selected object's color is a true color it returns the nearest ACI equivalent. ".TRUECOLOR" returns a true color if the selected object's color is a true color, or an ACI if its color is an ACI. Note that ".TRUECOLOR", and other expressions that can return true colors, return in valid format only if the type argument of (ade_expreval) is "string".

Color Patterns, comma-separated lists of colors in any of the valid formats, including ACI colors, always double-quoted. Color patterns are used to express multiple color conditions in compact format. Consider the color pattern "red, green". The pseudocode expression, color = "red,green", is logically equivalent to (color = "red") OR (color = "green"). Similarly, color &lt;&gt; "red,green" is logically equivalent to (color &lt;&gt; "red") AND (color &lt;&gt; "green").

Because color patterns are comma-separated lists, Color Book colors and RGB colors in query conditions are always bounded by escaped double quotes ('\"') because they are themselves comma-separated. For example, the following color pattern includes six colors: three ACIs, one RGB, and one Color Book color.

"12,34,56,\"12,34,56\",\"Pantone, 123 CVC\""

Note Note You can use wildcard characters when you specify a match string for Color Book colors (but not for RGB colors). For this reason, any wildcard character in a Color Book string that is meant to be taken literally must be escaped using a backquote, "`". For example, the "." character in the following string, normally a wildcard matching any non-alphanumeric character, is meant as a literal: "My`.Colors, Hot".

Colors in Query Conditions

You can specify ACI colors in query conditions as color names or color indexes. But if you retrieve such conditions, ACI colors are always reported as color indexes, because that is how they are stored, even if they were originally specified as color names.

However, this is not the case with color patterns, which can include color indexes, color names, or both. If you retrieve a query condition where color is specified as a color pattern, the color pattern is reported as it was originally specified.