EarthWorX64
Training Manual

Version 10.01

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Maps, Navigations, and Tools *1*

1.1 Objectives

After completing this chapter, you should know how to:

- Open and work with maps in GraphWorX64 and the Workbench
- Define and use views for faster navigation
- Navigate the map using the mouse and keyboard
- Use EarthWorX64 Pad

1.2 Introductions

EarthWorX64 provides real-time visualization to widely-dispersed assets such as factories, facilities, oil fields, and many others. The mapping function provides a drill-down capability so that you can view alarm conditions and statuses for any location on earth. EarthWorX64 integrates with Microsoft's Virtual Earth in order for users to view assets as symbols on different types of maps with very fine granularity. If you need to track movable assets during transportation, you can even monitor their motion via global positioning system (GPS) coordinates. You can also assign custom icons and configure them with fully customizable popup information boxes.

1.3 The EarthWorX64 Control and Container

You can configure EarthWorX64 as a standalone component within the Workbench, or as a viewer control inside a GraphWorX64 display. From the EarthWorX64 Viewer Control or the Container, you can add, remove, and edit objects.

1.3.1 Using EarthWorX64 in the Workbench

Similar to some of the products (e.g. AlarmWorX64 Viewer) in GENESIS64, EarthWorX64 comes with its own container. You can create an instance of this container inside the Workbench.

Once you have launched the Workbench, you can click on the EarthWorX down arrow and select the **New Gis** option in the ICONICS Viewers section of the Home ribbon, as shown in Figure 1.1.

Figure 1.1 - Creating a new EarthWorX Container

Once the page loads, you should see something similar to Figure 1.2 in the contents area of the Workbench. You are now ready to work with EarthWorX from the Workbench.

Figure 1.2 - Initial EarthWorX Configuration

1.3.2 Using EarthWorX64 in GraphWorX64

Aside from using the EarthWorX64 Container, you can also add an EarthWorX64 control onto your GraphWorX64 display. The EarthWorX64 Container has similar functionality with the EarthWorX64 control. The only difference is that when you use the EarthWorX64 Control in GraphWorX64, you get the extra GraphWorX64 functionality on the display.

To add an EarthWorX64 Control to a GraphWorX64 display, click on the **EarthWorX64 Viewer** button in the Controls section of the Controls ribbon in GraphWorX64.

Figure 1.3 - EarthWorX64 Viewer Control Button

Alternatively, you can click on the **EarthWorX64 Viewer** in the list of applications in the Toolbox explorer, as shown in Figure 1.4.

Figure 1.4 - EarthWorX64 Option in the Toolbox

Once you have click to create an EarthWorX64 Viewer Control, you can either click ***once*** on the design surface to create a control at the default size; or you can click and drag a bounding box on the design surface to create an EarthWorX64 control of any size that you wish. Figure 1.5 shows the sample display for a default EarthWorX64 control in GraphWorX64.

To activate an EarthWorX64 control in GraphWorX64, you must double-click on it. After the EarthWorX64 control is activated, you can configure and modify its various elements and features. Once the display appears, you can pan and zoom on the map, or switch modes between satellite pictures and maps.

Figure 1.5 - A Sample Display with an EarthWorX64 Control

1.4 Map Navigation

Navigating the map in EarthWorX64 is easy and intuitive. On the upper left-hand corner of the EarthWorX64 viewer, there are some menu options as shown in Figure 1.6.

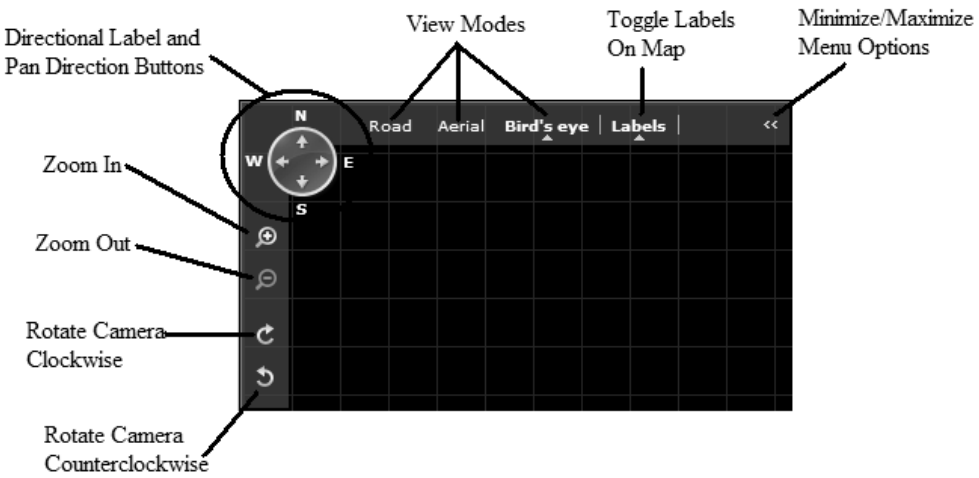

Figure 1.6 - EarthWorX64 Viewer Menu

As you can see from the figure, there are options to rotate the camera angles (these options are not available for all view modes), zoom in and out, move (pan) around on the map, change view modes and toggle the labels on a view mode if there were any.

The following view modes are available:

- **Road** allows you to view a 2D map with the street details on the map as shown in Figure 1.7.

Figure 1.7 - Road View

- **Aerial** allows you to view the map with mountain ranges as well as names of cities, states, and attractions. You can enable or disable labels on zoom levels that include labels.

Figure 1.8 - Aerial View with Labels

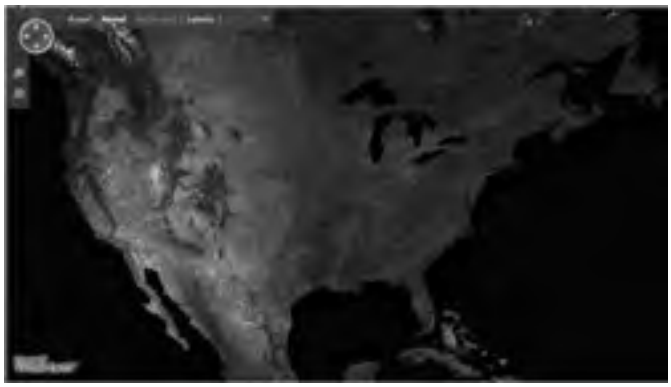

Figure 1.9 - Aerial View without Labels

- Bird's eye view is only available on certain zoom levels. The Bird's eye view is an oblique view of the world, taken by low-flying planes. It gives you a 3D image of the actual city structures. When you are in Bird's eye view, the rotate camera options become available. You can use these options to turn the picture around. Notice that the orientation of the direction label changes as you rotate the map.

Figure 1.10 - Bird's Eye View of Beacon Hill in Boston

The double arrows on the very far right of the menu allow you to minimize this menu if you do not want to use it. Once you minimized it, you can always expand it again with the expand button on the upper left-hand corner of the viewer.

If you minimize the menu bar, you can still navigate the map. You can drag the map around using your mouse, and you can zoom in and out by scrolling your mouse wheel. You can even zoom in an area by double-clicking on it.

Each command is also available on the keyboard:

- To **pan** the map, use the up, down, left, and right arrow keys.
- To **zoom** in and out, use the plus (+**)** key and minus (**-)** keys.
- To switch to a different **view mode**, press the **R** key for Road, the **A** key for Aerial, or the **B** key for Bird's eye.

1.5 The EarthWorX64 Pad

Once an EarthWorX64 control has been added to the design surface, a custom menu called the EarthWorX64 Pad appears as shown in Figure 1.11. With this menu, you can perform several tasks while in configuration mode. The pad is also available in runtime, but appears with fewer options. In runtime mode, only the runtime commands are available in the EarthWorX64 Pad.

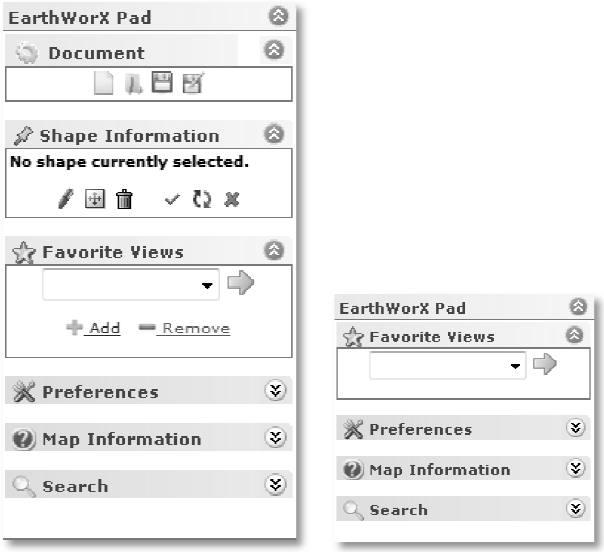

Figure 1.11 - EarthWorX64 Pad in Configuration Mode (Left) and Runtime Mode (Right)

We will now discuss each of the sections available.

1.5.1 Document

The first section is the Document section, which is available in configuration mode only. Using icons available in this section, you can manipulate the EarthWorX64 files that you see on screen. In the Document section, you can (from left to right): **create** a new display, **open** an existing display, **save** the current display, or **save** the current display under a new name (Save As) as shown in Figure 1.12.

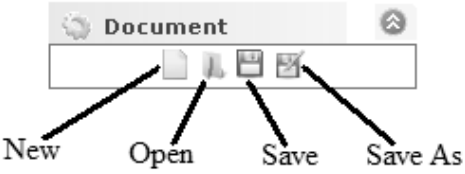

Figure 1.12 - Options in Documents

1.5.2 Shape Information

The second section is the Shape Information section. This section is also only available in configuration mode. Using the icons in the Shape Information section, you can manipulate the shapes you have added onto the map. We will discuss shapes in the next chapter. For now, consider shapes as something that you put on the map to mark a location. While configuring your display you can (from left to right): **edit** the currently selected shape, **move** the currently selected shape, **delete** the currently selected shape, **select all** the shapes on the map, **invert** current selection, and **cancel** current selection.

The Shape Information section changes depending on the shape or shapes that are selected. In Figure 1.13, the Shape Information section is shown with no shape selected, with a single shape selected, and with multiple shapes selected.

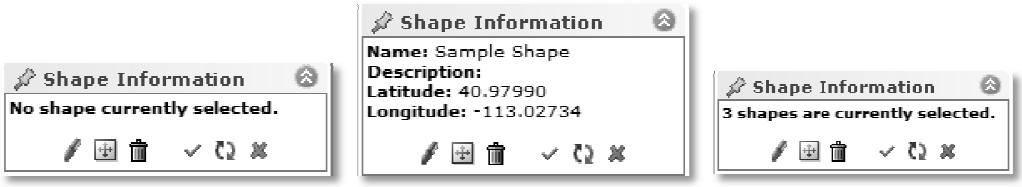

Figure 1.13 - Shape Information with Different Shape Selection

1.5.3 Favorite Views

Before we discuss the functionality of this section of the EarthWorX64 Pad, we should understand the idea of a view. A view is a set of information in which you can save that defines the following features of a geographic display:

- The geographic position
- The zoom level
- The view mode (road, aerial, or bird's eye)
- Any other information that may be useful in restoring the current view

Because you can save a view, you can return to it easily by a click of a mouse. Think of a view as a sort of *bookmark* for a location and context. You create and store a view in configuration mode, but you can use it in either configuration or runtime mode.

Although the search function can locate an address, views provide even more power for going directly to a set of viewing conditions. Adding views to EarthWorX64 means you can easily jump from one view to another by simply picking it from a dropdown list. If you have a view for each of your assets all over

the world, this makes it easy to navigate to each asset to monitor them, and can be a terrific timesaver.

Each view intelligently changes the zoom level, pans the map, and then zooms again, all the way down to the street level. For example, you can visualize a factory in a Los Angeles neighborhood at site view, and then quickly and easily go directly to a visualization of the street view of Fifth Avenue in New York City where your corporate headquarters is located.

You can manage views in the Favorite Views section. In this section, you can see the list of available views in the dropdown list and go to it, add a view, and remove a view.

To go to a view, select the view in the dropdown list and click on the yellow Go button. You can also remove a view by selecting it from the dropdown list and click on Remove Remove . A popup message will come up, as shown in Figure 1.14, to confirm that you want to remove the view. Click on OK to continue or click on Cancel if you have changed your mind about removing the view.

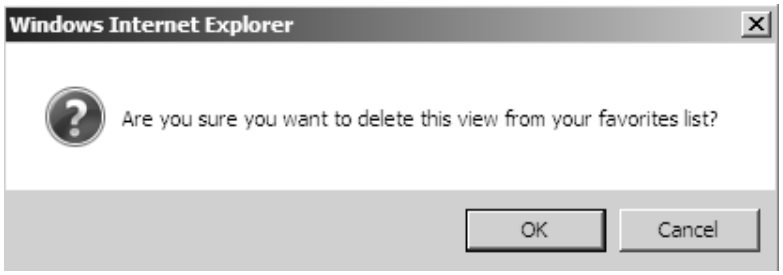

Figure 1.14 - Remove View Confirmation Dialog

To add a view, you can configure it in the map and click on Add Add . A window will come up asking you for a name of the view as shown in Figure 1.15. Give the view a name and click OK to continue. Otherwise, you can click on Cancel if you changed your mind in creating the view. Once you have added the view, you should see it populate in the dropdown list of your Favorite Views section. Now you can switch to this view in a click of a button.

Figure 1.15 - Prompt to Enter a Name for the View

1.5.4 Preferences

The Preferences section, shown in Figure 1.16, is available in both the configuration and runtime modes. In this section, you can manipulate how some of the objects shows on the map as well as decide if the objects shows at all.

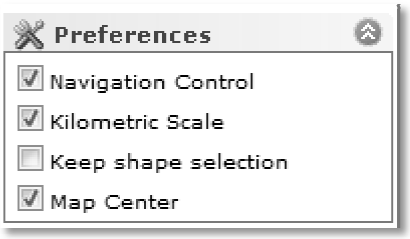

Figure 1.16 – Options in the Preferences Section

By default, the Navigation Controls and Keep shapes Selection options are checked. You can change these preferences if you like. In the Preferences section, you have the following options:

- **Navigation control**: a checkmark in this option displays the upper-left menu and control on the Virtual Earth map as shown in Figure 1.6. You can uncheck the option to hind this menu, however, you may just want to minimize it for easier access.
- **Kilometric scale**: by default, the scale of the map uses imperial units (miles). If you want to use metric units, you should place a checkmark in this option, which means the map will use kilometers to measure distances. If you prefer to use miles, then remove the checkmark.
- **Keep shape selection**: when you pan the map, you lose the current selection of shapes. A checkmark for this option means that you prefer to keep your selection even when panning the map.
- **Map center**. a checkmark in this option puts crosshairs at the center of the map to help you identify where the center is located. Hold the cursor over the crosshairs to see additional information about the coordinates of that point. To hide the crosshairs, remove the checkmark.

1.5.5 Map Information

The Map Information section, shown in Figure 1.17, is available in both configuration and runtime modes. It shows the latitude and longitude of the position at the center of the map and the current zoom level. You can modify the latitude and Longitude settings in the text box as well as choose as different zoom level in the dropdown list. If you know the coordinates of a location, you can type

it in directly in the appropriate textboxes and click on the yellow Go button or press the enter key on your keyboard. This brings the map directly to the entered location. If you know the address but not the coordinates, you can use the Search section instead.

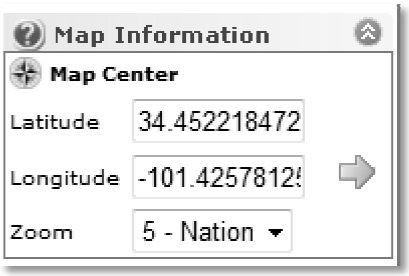

Figure 1.17 - Map Information

1.5.6 Search

The search section, shown in Figure 1.18, is available in both configuration and runtime modes. In this section, you can type in an address and it will show you a list of possible results so that you can pick the desired one.

Figure 1.18 - Search Section

The result of a search is shown in Figure 1.19. The different matches are shown in a results window allowing you to select the one that most closely matches your search target. You can click on the green arrow of the desire result to bring this location to the center of your map.

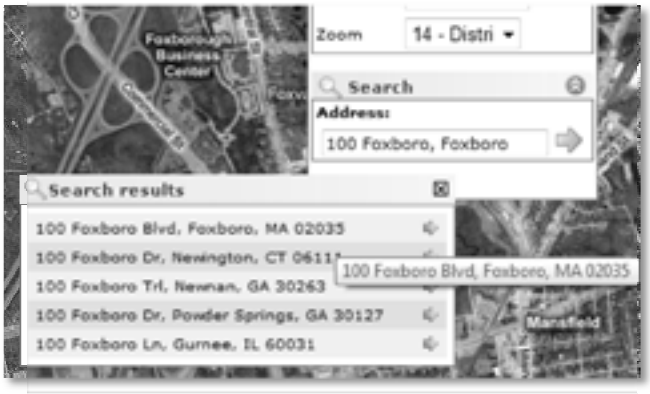

Figure 1.19 - Sample Search Results

1.6 Entering Runtime

When you are using the EarthWorX64 Viewer control in GraphWorX64, you can only enter runtime when the GraphWorX64 display goes into runtime. Similarly, you exit runtime when the display is in configuration mode.

To toggle between runtime and configuration mode in the EarthWorX64 container, you can use the EarthWorX64 Pad. When the EarthWorX Pad displays as a standalone application in the Workbench, an application status displays at the top of the Pad as shown in Figure 1.20. When label displays Configuration Mode, you can click on the green Go to Runtime button to go into runtime mode. When you are in runtime mode, the label shows that you are in this mode by displaying Runtime Mode in the label. The Go to Runtime button is disabled, but you can click on the Go to Configuration button to go into configuration mode.

Figure 1.20 – Toggling between Configuration and Runtime Mode

Lab: Creating an EarthWorX64 Display *1*

1.1 Lab Overview

It is important to associate assent information on a map so that when users look at the information, they can also associate where the information comes from. This is especially helpful in an international cooperation like icTonics. With plants all over the world, headquarters would like to track how the plants are doing with a few clicks. In this lab, we will create a display that allows the icTonics headquarter to zoom into different plant locations. In the next lab, we will add plant information to the map.

Estimated time to complete this lab: 20 minutes

1.1.1 Task Checklist

In this lab, you will complete the following tasks:

- Add an EarthWorX64 Control
- Create different views

1.1.2 Support Files

You do not need any support files to complete this lab.

1.2 icTonics World Map

To allow headquarters to view information about individual plants, we will need to first create a display with a map.

1. Open the Workbench by going to Start → Programs → ICONICS GENESIS64 → Workbench if it is not already opened.

2. From within the Workbench, create a new GraphWorX64 display by clicking on the GraphWorX64 button in the ICONICS Viewers section of the Home ribbon.

3. Apply the icTonics Template to the display. Your display should now look similar to Figure L1.1.

Figure L1.1 - icTonics Template

4. Add the EarthWorX64 Control onto the display by going to the Controls ribbon, then select the EarthWorX64 Viewer in the Controls section.

5. Click and drag the crosshair from the top left corner just under the banner to the lower right-hand corner of the display. The EarthWorX64 viewer should take up the entire display as shown in Figure 1.2.

Figure 1.2 - icTonics EarthWorX64 Display

6. Save the display as “icTonicsPlantInformation”.

7. Using the EarthWorX Pad, change the zoom level in the Map Information section to level 4.

8. Save this view by clicking on the Add link in the Favorite Views section. Name this view “US Road Map”.

9. Change the view mode from Road to Aerial and search for the address: 100 Foxboro blvd and zoom to the street level.

10. Save the view as “Foxboro Plant”. It should look something similar to Figure 1.3

Figure 1.3 - Map of 100 Foxboro Blvd

11. Since we are working on the international level, let us change the default map scale to use kilometers instead of miles. In the Preferences section, check the kilometric Scale option.

12. Change the map location to find Plzen, Czech Republic. Save the view on City level as the “Plazen Plant”

13. We will save one more view. Change the map to center on Shenzhen, China. Then add a view call the “Shenzhen Plant”.

14. Click on each of the views and make sure that you can view them as you saved it.

You have finished the first lab for the EarthWorX64 course. In the next lab, we will add objects and associate data to these objects to reflect plant states on the map.

Maps, Navigations, and Tools Review

R1

1.1 Objectives Review

After completing this chapter, you should know how to:

- Open an instances of EarthWorX64 in the Workbench and GraphWorX64
- Define and use views for faster navigation
- Navigate the map using the mouse and keyboard
- Use the EarthWorX64 Pad

1.2 Summary

EarthWorX64 integrates with Microsoft's Virtual Earth to provide mapping capabilities to GENESIS64. Using EarthWorX64, you can visualize widely-dispersed assets on a map as well as track movable assets.

You can use and configure EarthWorX64 from GraphWorX64 and from the Workbench. Navigate the map is easy and can be done both by using the mouse and the keyboard.

It is possible to define views that act like bookmarks for a map that you want to be able to return to easily. Using views, you can quickly jump from one place to another on the map. A view consists not only of the geographical location itself, it can also contain the zoom level and the type of map shown.

EarthWorX64 configuration is performed directly on the map, and you can use the EarthWorX64 Pad to perform some common tasks, like defining views, selecting shapes, or searching for an address.

1.3 Terms

EarthWorX64 View | EarthWorX Pad | Microsoft Virtual Earth

1.4 Test Your Knowledge

In this chapter, we discussed how to configure and use EarthWorX64. Before continuing to the next chapter, make sure you can answer the questions below:

1. In which applications can you insert an EarthWorX64 viewer?

   a. TrendWorX64
   b. Workbench
   c. GraphWorX64
   d. AlarmWorX64
   e. All of the above
   f. Only A and B
   g. Only B and C
   h. Only C and D
   i. None of the above

2. What is the name of the technology EarthWorX64 is based on?

   a. ICONICS Map Monitor
   b. Microsoft Virtual Earth
   c. Yahoo Maps
   d. Google Maps
   e. MapQuest

3. What is EarthWorX64 used for?

   a. It provides visibility to widely-dispersed assets
   b. It tracks moving assets using GPS
   c. It provides visibility to alarm conditions worldwide at a glance
   d. All of the above
   e. None of the above

4. How many views can you have in a map?

   a. 1
   b. 2
   c. 10
   d. Depends on your license
   e. No limit

5. True or False: If you are looking at the map in Road mode and you switch to a view saved in Aerial mode, the map will remain in Road mode. True or False?

6. True or False: You can find out the latitude and longitude of the current geographical position?

7. True or False: EarthWorX64 uses only miles to measure distances on the map.

Shapes 2

2.1 Objectives

After completing this chapter, you should know how to:

- Work with the different shapes that are available
- Configure shapes on the map
- Associate OPC data to your shapes
- Associate Alarms to your shapes
- Define actions for your shapes
- Use GPS data to locate your assets

2.2 Introduction to EarthWorX64 Shapes

In EarthWorX64, a shape is an object that you can put on the map associating some useful information. There are three different types of shapes you can add to a map, including:

- **Pushpin** is a simple customizable icon that identifies a specific asset.
- **Textpin** is similar to a pushpin, the textpin uses a text box rather than an icon to identify assets.
- **Smartpin** is a multi-component object composed of Smart Icons. Each cell in a Smartpin can be assigned a color (and other properties) to identify the status of a specific asset at a location.

Figure 2.1 shows these three different symbols in use on a map.

You can associate a large range of dynamic data to each of these shapes. Among the connections that you can establish are those to OPC DA, OPC UA, SNMP, and many others. In this chapter, we will describe in details the shapes available, and how to configure each to link with a data source to show useful information.

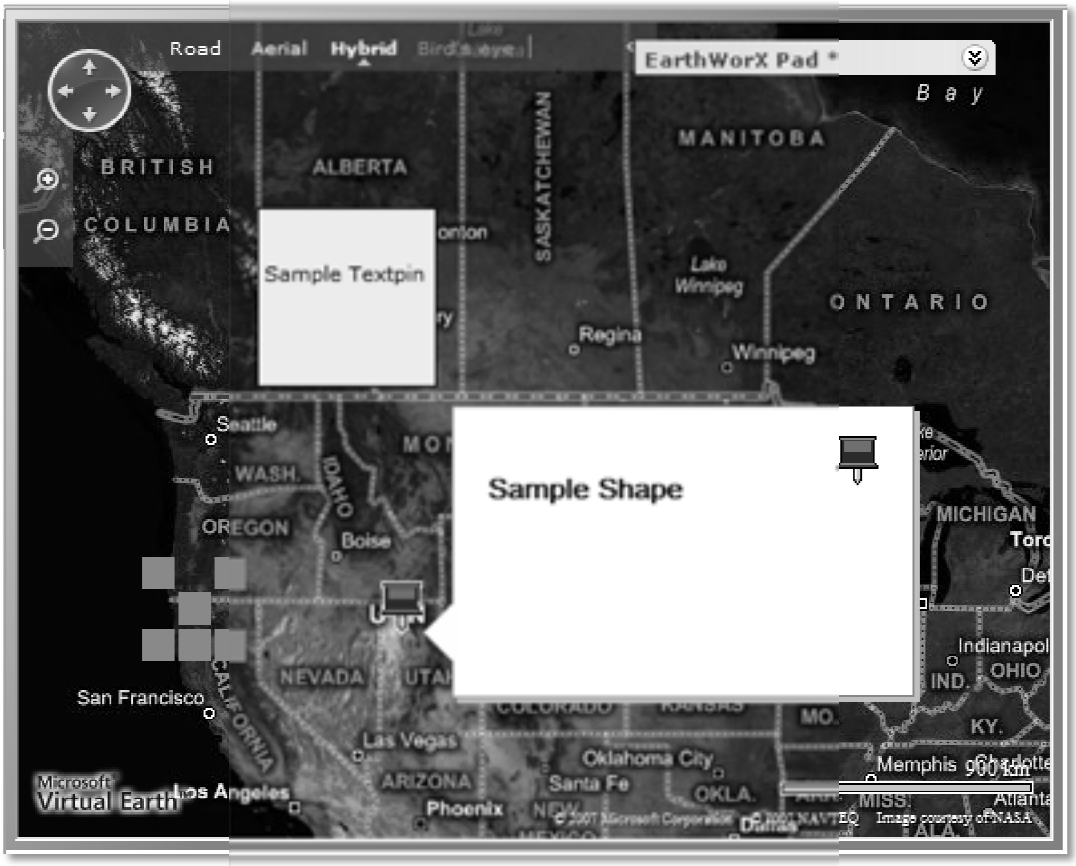

Figure 2.1 - EarthWorX64 Shapes

2.3 Pushpins

The pushpin is the simplest shape that you can put on the map. A pushpin is used for locating and identifying a specific asset at a position. The tooltip that pops up when you mouse the cursor over a pushpin can be customized to show real-time data coming from the asset. The tooltip can show real-time data from *any* data source that is available in GENESIS64.

For example, you have ten facilities on a map and you want to know the overall productivity level of each of those facilities. You also want to display some additional key performance indicators (KPIs). A KPI is an overall measure of a process's efficiency. You add ten pushpins to the map and connect each pushpin to the appropriate data sources coming from the facility the pushpin represents. You can better identify each of those facilities by using custom icons, like the three shown in Figure 2.2. Each pushpin that you add to the map can use a unique custom icon. In Figure 2.2, you can see them in the shapes of a star, globe, and a push pin.

Figure 2.2 - Sample Pushpins with Custom Icons

Because the pushpins you create can have different shapes and colors, it makes them easier for users to find and quickly identify. Custom information you add to the pushpin appears in a popup dialog when you hold your cursor over a shape, as shown in Figure 2.2.

2.4 Textpins

A textpin is similar to a pushpin, but its appearance is slightly different. Instead of using an icon to identify an asset, a textpin uses a textbox that holds information about the asset. A textpin's information is easy to view and access. The drawback to using a textpin instead of a pushpin is that a textpin uses more space on the map. If a map has many assets, the smaller size pushpin offers an advantage over the larger size textpin. Figure 2.3 illustrates a textpin on a map.

Figure 2.3 - Textpin Example

2.5 Smart Pins

Smartpins are a valuable tool when you need to identify a large number of geographically-dispersed assets quickly. A Smartpin is a multi-celled data symbol in pictograph form, where each cell in the Smartpin represents a data value and displays data status by way of colors. Because Smartpins can show the statuses of different characteristics of an object, such as sensors in a vehicle or monitors on a patient, they are used to quickly visualize many aspects of an asset on a map.

Consider using a Smartpin when you want to visualize a set of information for each specific geographically-dispersed asset. Your users will quickly learn what each Smartpin shape represents, and will be able to react quickly to changing conditions.

Smartpins are completely customizable and come in a variety of shapes. In any Smartpin, you define the number and distribution of cells, how each cell connects to data, and how each cell or icon behaves. Figure 2.4 shows a Smartpin with its information box displayed.

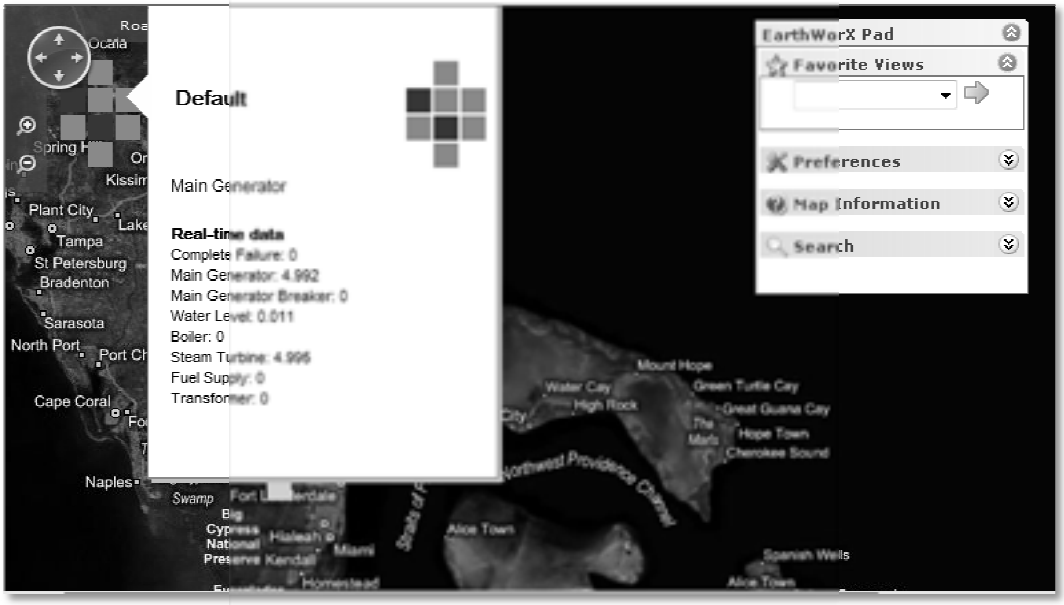

Figure 2.4 - An Example of a Smartpin and Its Information Box

You can create Smartpins that are quite different from one another. It is possible to give Smartpins various shapes and different numbers of cells in order to create unique and meaningful objects. For example, the shape of a Smartpin might mimic the shape of the asset it represents, or it can simply be a standard shape meant to represent a specific set of information. When creating a Smartpin, you

associate each Smart Icon (cell) with a data source that feeds a value to the cell and determines the cell's color.

There are five possible intervals or state for each cell and the color it displays in runtime reflects those intervals. The colors used for the five possible intervals are:

- **Blue** – the asset's value has fallen to, or below the LowLow threshold
- **Light blue** – the asset's value has fallen between the Low threshold (inclusive) and the LowLow threshold (exclusive)
- **Green** – the asset is in a normal state; between the Low and High threshold exclusively
- **Yellow** – the asset's value has risen to between the High threshold (inclusive) and HighHigh threshold (exclusive)
- **Red** – the asset's value has risen to, or above the HighHigh threshold

You set the thresholds (that is, the LowLow, Low, High, and HighHigh values) for each cell when you configure the Smartpin. Therefore, *you* control the meaning assigned to each color change. In Figure 2.5, you can see what happens when a value goes out of the normal range, which indicates a problem.

Figure 2.5 - A Map with a Smartpin with a Warning Condition

The warning is immediately made visible by the red Smart Icon cell (at the top right) Figure 2.5, even though the map displays 28 different data points. The meaning of each color is determined by the nature of the data point and the threshold levels you set for notifying operators using color changes. Typically, blue means that the situation is better than expected while red indicates there's a problem, but this is just the default interpretation; you may use any interpretation you wish.

2.6 Adding a Shape to a Map

Now that we have a general understanding of the different shapes available on a map, let us look at how we can add these shapes.

The way you add a shape to the map is simple and intuitive. You can right-click on the map where you want to add the shape. In the popup menu, select Add Shape as shown in Figure 2.6, and choose the type of Shape you wish to add.

Figure 2.6 The Shape pop-up menu

Once you choose the type of shape you wish to add, a dialog appears, allowing you to configure the properties of the shape. Figure 2.7 illustrates the properties dialog for a Pushpin.

Figure 2.7 - The New Pushpin Dialog

You can then edit the different attributes for the shape and click on OK when you are done. Since the configuration of the shapes contain similar properties in the properties dialog, we will go through each tab of the properties pointing out those that are different on a particular shape.

2.6.1 The Main Tab

The main tab is where you can configure some basic information about the shape. For the most part, you can configure a name and an optional description for the shape. Since this tab is a bit different for each of the shapes, we will describe each in details.

2.6.1.1 Main Tab of a Textpin

Figure 2.8 illustrates the Main tab of a textpin. This is the most basic form of this tab. In here, you can specify the name and the optional description for the shape.

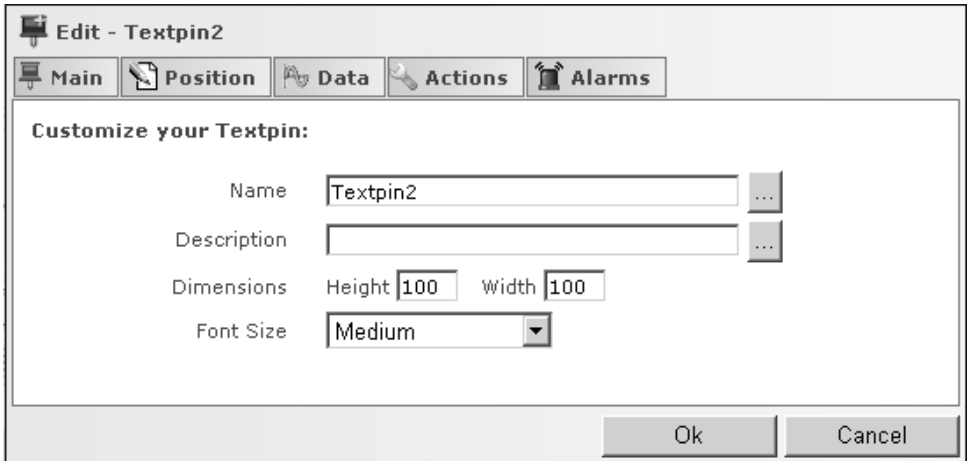

Figure 2.8 - Textpin: Main Tab

You can also change the dimensions of the text area in pixels and the displayed font size.

2.6.1.2 Main Tab of a Pushpin

For the Pushpin, you have the following options besides the name and description:

- **Image URL** – you can put the location of an image that you want to use to represent the Pushpin.
- **Image Offset** – allows you to move the location of the Pushpin. The location at which you click to create the Pushpin contains the x and y location of the center of the Pushpin. If you need to move the Pushpin, you can enter the X (horizontal) and Y (vertical) value in pixels to move the object.
- **Scaling** – allows you to change the size of the image. Depending on the zoom level you are at, your Pushpin can have a different size.
- **Preview** – gives you a preview of the selected image.

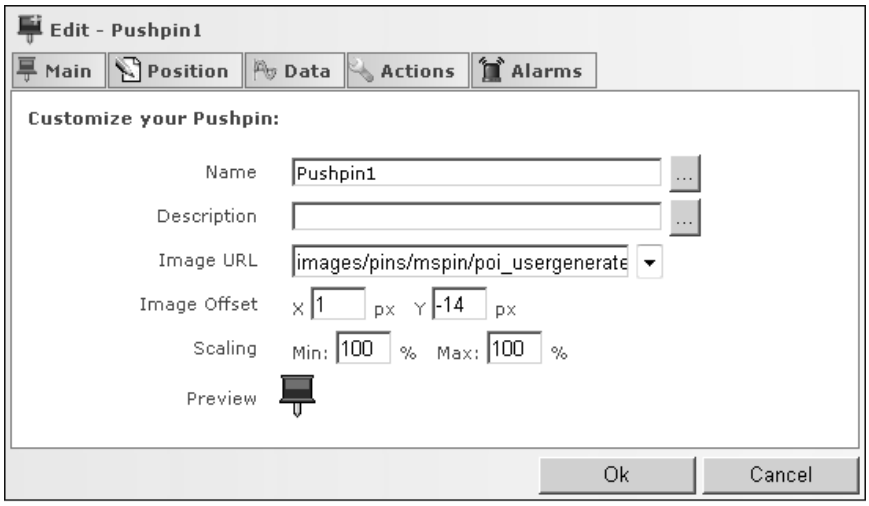

Figure 2.9 - Pushpin: Main Tab

2.6.1.3 Main Tab of a Smart Icon

The Main tab for a Smartpin is very different from a Pushpin and Textpin; we will leave this last to discuss. Let us look at the Main tab of Smart Icons, which are components that makes up a Smartpin.

The Main tab of a Smart Icon is shown in Figure 2.10. As you can see from the figure, you can assign a name, data source, and thresholds to the Smart Icon. You can click on the ellipse button to the right of the Data Source field to bring up the Data Browser and select the appropriate tag.

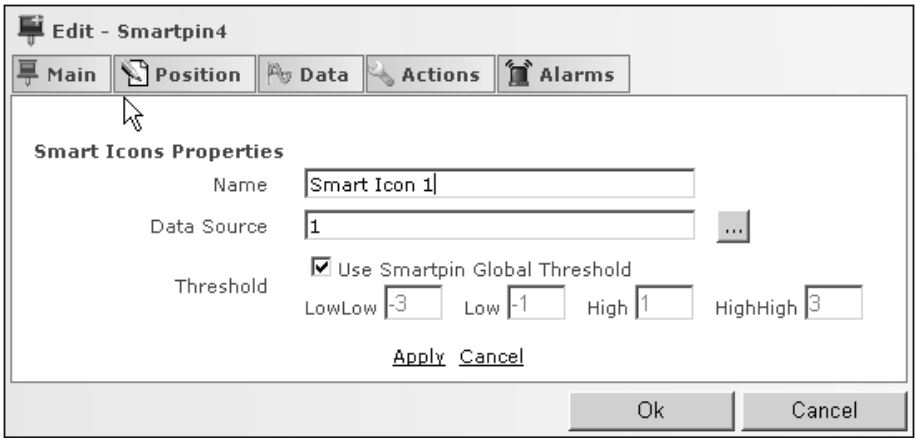

Figure 2.10 - Smart Icon: Main Tab

If you check to use the Smartpin Global Threshold option, this means that it will use the Thresholds set in the Main tab of the Smartpin. You can uncheck this option and give it different threshold values for the individual Smart Icon if you wish.

When you are done configuring on this tab, click on the Apply link to save your changes. If you have changed your mind on your edits, click on Cancel to discard the changes. Both links will bring you back to the Main tab of the Smartpin properties dialog.

2.6.1.4 Main Tab of a Smartpin

Since a Smartpin is a collection of Smart Icons, its Main tab contains the Smart Icon's properties as well as its own properties as shown in Figure 2.11. Let us start by discussing the Smartpin properties.

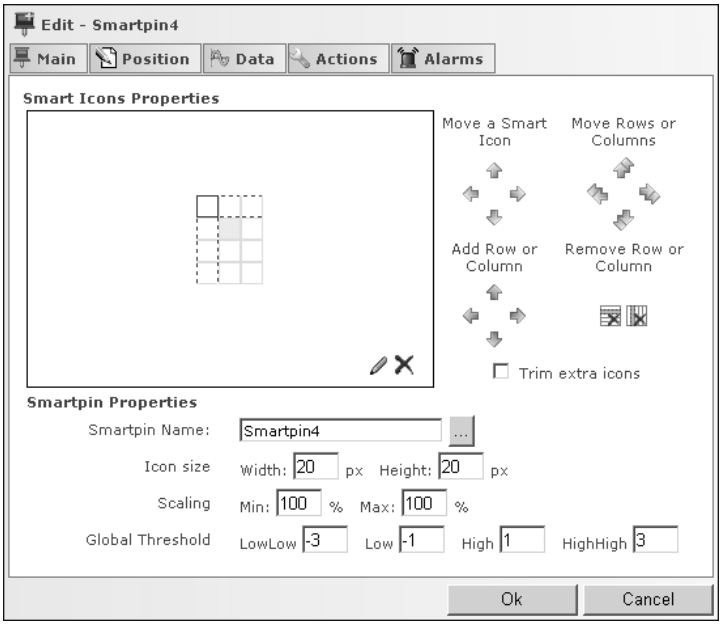

Figure 2.11 - Smartpin: Main Tab

The **Smartpin Properties** section sets values for the entire Smartpin – that is, for all of the Smart Icons that make up the Smartpin. In this section, you have the following options:

- **Smartpin Name** – enter a name for the entire Smartpin. You can use data source such as Global Alias and Language Alias for the name if you wish.
- **Icon Size** – specify the size of the entire Smartpin in pixels.
- **Scaling** – is similar to Scaling for a Pushpin. This option resizes the Smartpin in relation to the current zoom level at runtime. For example, if you specify **30%** as the **Min** value and **300%** as the **Max** value, the Smartpin will be quite small in a world-level zoom, and very big in a street-level zoom. You might want to experiment with scaling to see the results for yourself.

- **Global Threshold** – sets the range of values of the data source when the Smart Icon's color changes. You can override these ranges for each Smart Icon.

In the upper parts of the Main tab of the Smartpin properties, you see a section for Smart Icons Properties. The cells in the **Smart Icons Properties** section are where you configure the Smart Icons that make up the Smartpin definition. This grid provides the framework for formatting a pattern of Smart Icons.

A Smartpin's grid can be as small as one single cell or as large as a 10-by-10 grid made up of 100 cells. The size of the grid and the shape created by its Smart Icons can give helpful clues to runtime operators who must work with these Smartpins. For example, you can shape a Smartpin to mimic the physical features of the asset being monitored – like a hospital patient where each cell is a sensor for arms, legs, heart.

You can manipulate the Smart Icon configuration grid by using the icons to the right of the grid. Before you use any of these actions, you should select the Smart Icon that you wish to manipulate.

You can move the Smart Icon by clicking on the green Move buttons as shown in Figure 2.12 to move a single icon, or to move a row or column. Experiment with the buttons to see how they work.

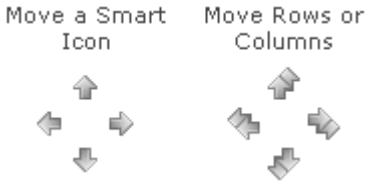

Figure 2.12 - Buttons for Moving Smart Icons

You can also change the size of the grid by clicking on the Add Row or Column buttons to insert a row to the grid. Clicking the Remove Row or Column buttons deletes a row from the grid. You might want to experiment with these buttons to understand how they work.

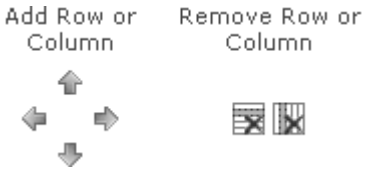

Figure 2.13 - Buttons for Adding or Removing a Row or Column

The **Trim extra icons** option allows you to remove extra rows and columns created to shrink the size of the Smartpin. This helps you delete unwanted rows and columns with a click of a button.

You can edit the properties of the Smart Icon by double-clicking on it, click on the Edit button in the grid after selecting the desire Smart Icon to edit. You can also click on the Delete button in the grid to remove the selected Smart Icon.

You can tell if a Smart Icon is configured with a data source in the grid. A configured Smart Icon cell that does not have a data source is *orange* in the grid, whereas a configured Smart Icon that does have a data source is *green*.

2.6.2 The Position Tab

The Position tab shown in Figure 2.14 is the same for all of the different shapes. It allows you to configure position-related settings. The tab also lets you control the EarthWorX64 decluttering feature, which makes it easier to view and work with a complex and densely-populated map.

Figure 2.14 - The Position Tab

The Position tab allows you to control the shape's location in one of three ways:

- **Fixed Position**: You can control the shape's exact location on the map by entering the latitude and longitude in the text boxes if you select the Fixed

Position option. If you are satisfied with the location of your shape, then you do not need to change these settings.

- **Data Driven**: You can use OPC data to drive an asset movement if you have any geographical data coming from an OPC server. To allow data sources to provide the position for the shape, you would select the **Data Driven** option, and then specify the external data sources that control the latitude and longitude. A data source can be a tag, a value in a database, an OPC source, or another static or dynamic data. The shape moves on the map in response to the values of the data sources you specify.
- **GPS Position**: Selecting the **GPS Position** option is useful if the shape on the map represents a moving asset (for example, a truck or an airplane) that has a GPS device such as a mobile phone whose signal you can capture. The **GPS Device** field has a dropdown list of the available devices. The appropriate application for the selected device must be installed on client machines so that a smart phone with the EarthWorX64 GPS Web Service can notify the EarthWorX64 server about its updated position.

The second section in this tab is **Zoom Level Visibility**. If you want to hide a shape when the map is zoomed to a certain range, you can use this section to suppress its display. For example, in a cluttered display of a city street where each house is labeled, you might want to suppress house markers when looking at the map at the state level or even the neighborhood level in order to make the map readable. This feature is often referred to as a *declutter* option. EarthWorX64 allows zoom levels from 1 to 19 based on the Virtual Earth mapping engine. Zoom level 1 is the world view, while zoom level 19 is a detailed view down to meters or yards.

2.6.3 The Data Tab

For a shape to be useful, it must be connected to data – either an alarm or a data source. To subscribe to a data source, use the **Data** tab of the shape's properties dialog box.

This tab shows a list of data sources that is related to the shape. You can click on the **Add new Data Source** link to open the Data Browser and add a new data source.

Once you have selected the tag or expression, you can change the Name of the data source by clicking in the Name column as shown in Figure 2.15. You can also manually edit the data source by clicking in the Data Source Column.

If you want to change the OPC tag by browsing for it, you can click on the ellipse button for the data source to bring up the Data Browse and select at new tag. You can also delete the data source by clicking on the Delete button.

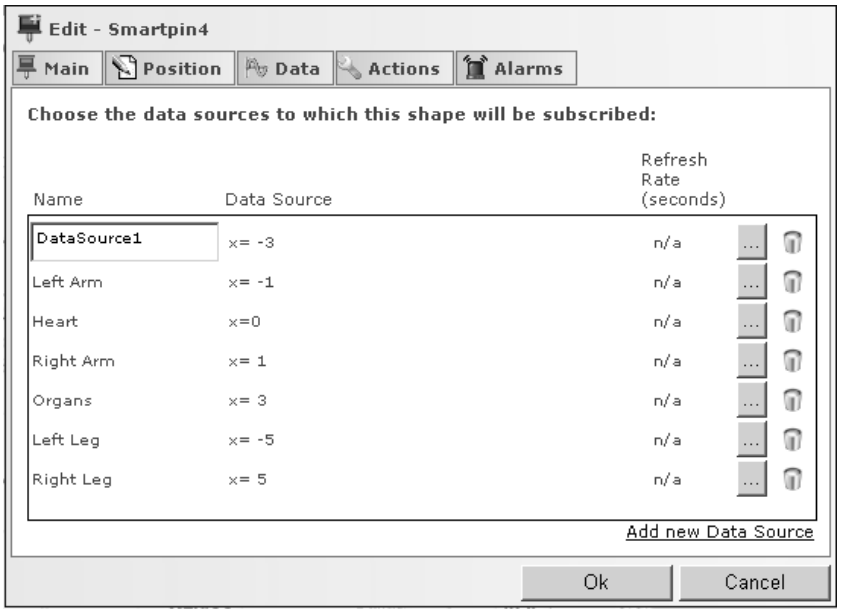

Figure 2.15 - Share Properties Data Tab

Note that for a Smartpin, any data source that you have added while configuring a Smart Icon is listed in this tab. You can add in additional data source for the Smartpin if you wish.

2.6.4 The Actions Tab

You can associate an action to each shape such that during runtime, a user can perform the action by clicking on the shape. You can do this by configuring the Actions tab.

This tab is divided into two sections. The upper section, shown in Figure 2.16, allows you to select the action to run, how to trigger the action, and if tooltips are enabled.

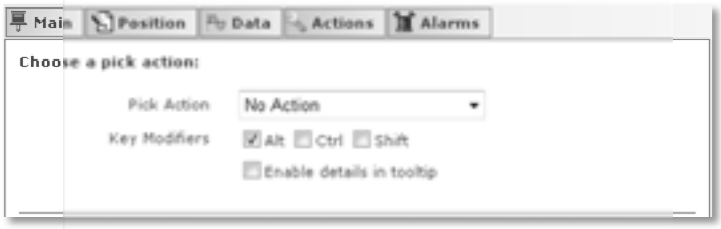

Figure 2.16 - The Actions Tab: Choose a Pick Action

If you check the last option to **Enable details in tooltip**, you will be able to see the action details in the tooltip that comes up when you put your mouse over the shape.

The Key Modifiers has three checkboxes. Checking the respective box allows you to trigger the action by holding that key and clicking on the shape. For example, by default, the **Alt** box is checked. This means in order to perform the action, the user must hold-down the Alt key, and click on the shape. If you leave all three checkboxes unchecked, you can simply click on the shape to perform the configured action.

The action that you trigger in runtime depends on how you configure it. In EarthWorX64, there are different kinds of actions that can occur when a runtime user clicks on the shape. You can choose an action from the **Pick Action** dropdown list as shown in Figure 2.17.

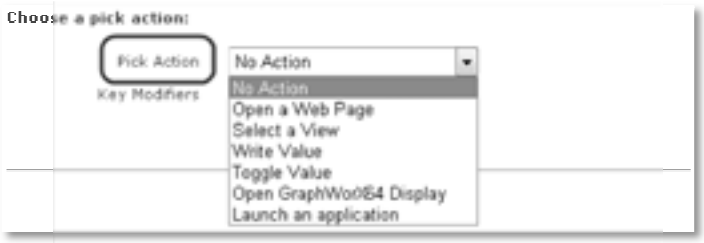

Figure 2.17 - List of pick actions

Choosing a pick action causes the dialog box to display the options necessary to configure the action in the second half of the tab. Since each pick action is comprised of different configuration options, we will describe each next.

2.6.4.1 Open a Web Page

Choosing this option will allow a runtime user's click to launch a web page. Figure 2.18 shows the options for this pick action. You have the following options:

- **Web Page Address**: allows you can specify the web address that the window should open when the action triggers.
- **Title**: You can specify a title to the window that opens the web page. This option only applies if you are opening a new window.
- **New Window**: In this dropdown list, you can choose to open the web page in a new window (default option), or to open it in the same window. If you choose to open the web page in a new window, you will also have these options:
    - **Width**: define the width of the new window

- **Height**: define the height of the new window
- **Show Browser Controls**: configures the IE window that opens to contain controls such as the address bar, file menu options, etc. If you do not check this option, the window will open with no IE configuration options.

Figure 2.18 - Web Page Action Properties

2.6.4.2 Select a View

This pick action allows a runtime user to change to a specific view. After you have selected this pick action, you can select the particular view in the **Choose a View** box, as shown in Figure 2.19. You must have the view configured already in order to choose it in the dropdown list.

Figure 2.19 - Select a View Action Properties

2.6.4.3 Write Value

You can allow a user to writes a value to a particular data source during runtime by using this pick action. Once you have selected this pick action, specify the data source in the **Tag** field. You can click on the ellipse button to the right of the field to bring up the Data Browser and use it to select the tag instead of typing it into the field. Then, give the value to write to the data source in the Value field when the user triggers the action. The pick actions options are shown in Figure 2.20.

Figure 2.20 - Write Value Action Properties

2.6.4.4 Toggle Value

Aside from writing a single value to a tag, you can also toggle a tags value using a Shape. This action is similar to the Write Value action except the value written alternates between the two values that you enter in the Value 1 and Value 2 fields, as shown below in Figure 2.21.

Figure 2.21 - Toggle Value Action Properties

You would enter the data source in the Tag field as if you were configuring a Write Value pick action. The Data Browser is available for you to select a tag just the same.

2.6.4.5 Open GraphWorX64 Display

A runtime user can open a GraphWorX64 display in a new window by using the Open GraphWorX64 Display pick action. Once you have selected this pick action, in the action's properties section, click on the ellipsis button to browse for the display.

Figure 2.22 - Open a GraphWorX64 Display Action Properties

2.6.4.6 Launch an Application

This pick action allows a runtime user's click to launch the specified application or opens the specified document. You may want users to be able to start a Notepad (notepad.exe) session, or you may want them to open the document called MyDocument.pdf, which would start Acrobat Reader or any other PDF reader installed on client machines. Each document opens in its default application. The pick action launches the file or application specified in the File field of the pick action's properties.

For example, in a Smartpin, you configure an alarm file in the **File** field shown in Figure 2.23. When an alarm condition occurs, a runtime user can hold down the **Alt** key and click on the Smartpin, which launches the alarm in AlarmWorX64 Viewer. Note that the document or application will open only if the runtime user has the required permissions on the system he or she is working on.

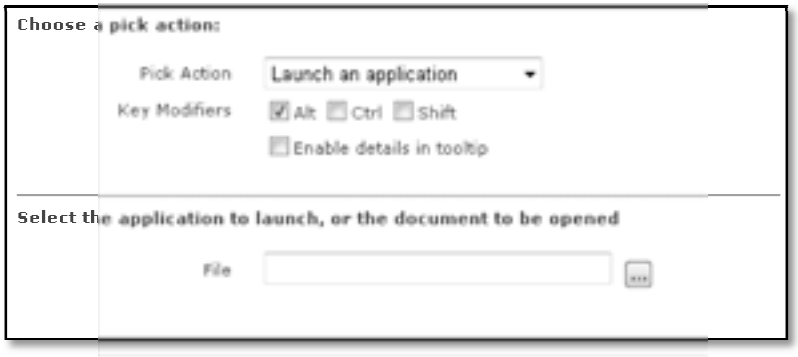

Figure 2.23 - Launch an Application Action Properties

2.6.5 The Alarm Tab

It is particularly useful to be able to assign an alarm to a shape and use the shape to monitor assets of interest.

To highlight an alarm condition, you can configure a pushpin or text pin to change to an alternative shape state when an alarm situation occurs. The alternative state can be configured to use a different icon so that, for example, when an alarm situation occurs, the pushpin switches to an alternate icon. This provides an instant visual signal that tells users that an alarm is currently active.

Smartpins cannot switch icons. However, a Smartpin cell that is connected to an alarm can change the color of its fill or line, and/or blink.

In fact, alarms are especially effective when used with Smartpins. With a Smartpin, you can reuse a pattern of cells so that the cells always reflect the same set of multiple alarms and is meaningful to your operators.

To **configure an alarm** subscription for a shape, use the **Alarms** tab of the configuration properties dialog shown in Figure 2.24. Since we are working with alarms, we will need to first subscribe to an alarm server to receive alarm notifications. Click on the **Add Subscription** link at the bottom of the dialog, which opens the Configure Subscription dialog.

Figure 2.24 - The Alarms Tab

The Configure Subscription dialog is shown in Figure 2.25. By the fault, there is a subscription for the local alarm server already. You can either use that or click on the Add button in the Edit Event Points section and select the alarm server from the Data Browser. You can also remove or edit the current subscription by clicking on the Delete or Edit button respectively.

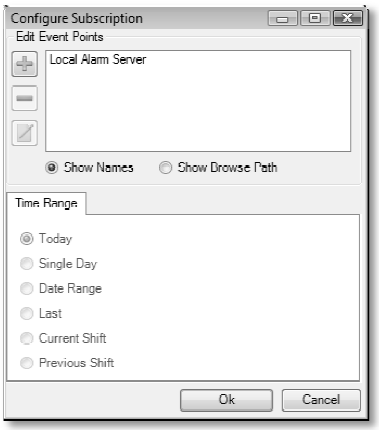

Figure 2.25 - The Configure Subscription Dialog

NOTE: For more information on how to edit a subscription and the different properties of an alarm subscription, please refer to the AlarmWorX64 documentations.

Once you have subscribed to the alarms in which you want to receive notification for, click on the **OK** button to set the alarm subscription. This will return you to the Alarms Tab of the shapes properties dialog.

A set of icons now appear to the right of the subscription listing in the Alarm Tab, as shown in Figure 2.26 below. You can use these buttons to (from left to right) edit the subscription, delete the subscription, or assign a state to the subscription.

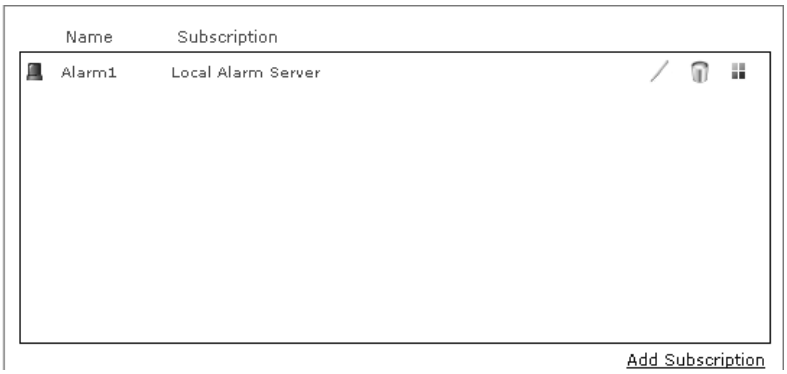

Figure 2.26 - Alarm Subscription List

To **edit** the alarm subscription, click on the Edit icon. This brings up the Configure Subscription dialog. You can remove the subscription by clicking on the Delete icon.

The last icon is the Edit State icon, which allows you to configure some action in case of an active alarm. The configuration dialog is shown in Figure 2.27.

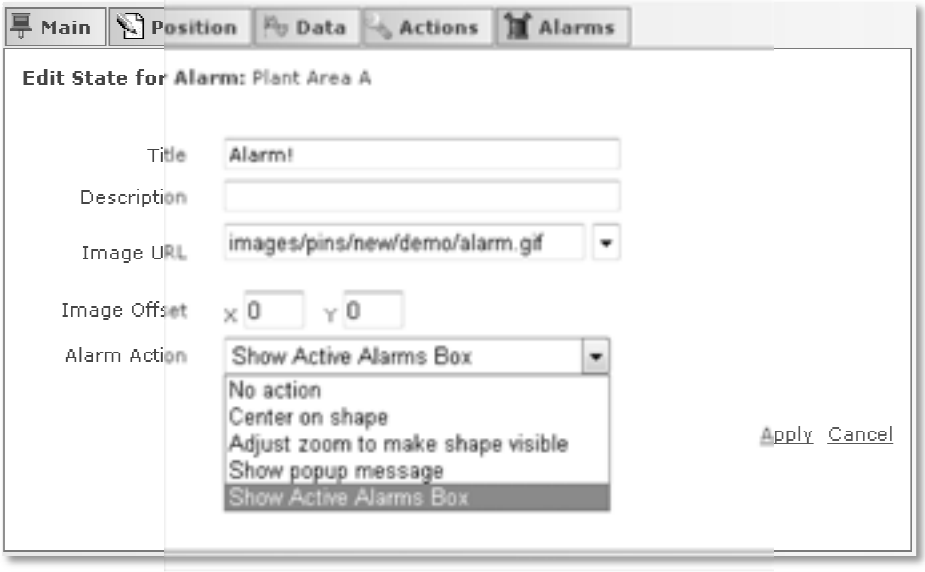

Figure 2.27 - The Alarms Tab: Edit State

In this dialog, you can name the state of the alarm and give it an optional description. If you would like to use a different icon or image on the map when the alarm occurs, then choose the alarm image in the Image URL dropdown list. If you do not see an icon you would like, you can manually enter the address of the image you wish to use. If you choose to use a different image when the alarm goes off, you can optionally set the offsets for this image.

Finally, you can specify an alarm action, that is, a behavior when an alarm condition occurs. The options include:

- No action (default)
- Center on shape: when an alarm occurs, moves the map so that the shape associated to the alarm is in the center of the map
- Adjust zoom to make shape visible: if when the alarm occurs, the shape is not visible, zoom in or zoom out on the map until the shape is available.
- Show popup message: when an alarm occurs, use a popup window to indicate the alarm is active.
- Show Active Alarms box: when an alarm occurs, show the global Active Alarms window as shown in Figure 2.27.

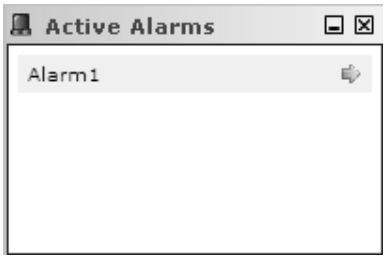

Figure 2.28 - Active Alarms Window

When you are done configuring the alarm state, click on the **Apply** link to save the changes. Alternatively, you can click on the **Cancel** link to delete the changes. Both options will bring you back to the Alarms tab.

In runtime, you will see the image you selected for the shape if you are using a pushpin, and you will see the shape respond to alarm conditions by using the alarm action you selected for all shapes.

2.7 Manipulating Objects on a Map

Once you have added a shape to your map, you can manipulate it using the right-click popup menu. Figure 2.29 shows the options available in this right-click popup menu.

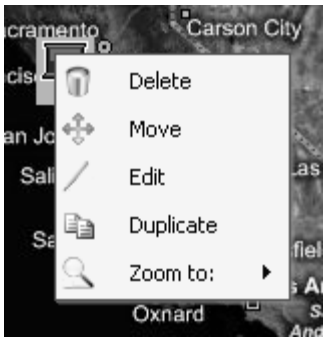

Figure 2.29 - A Shape Context Menu

The options include:

- **Delete**: removes the shape from the map.
- **Move**: allow you to move the shape to a different location. After you select this option, the cursor changes to a crosshair +. You can then move the cursor to the location where you want to move the shape and then click on that location to put the shape there.
- **Edit**: opens the shape's properties dialog box as discuss in the previous section so that you can change any of the shape's properties.
- **Duplicate**: allows you to make a copy of the shape. After you select this option, the cursor changes to a crosshair +. You can then move the cursor to the location where you want to place a copy of the shape and then click on that location to put the duplicate there.
- **Zoom to**: lets you choose from a predefined set of zoom levels. It also adjusts the map position so the shape is in the center.

Lab: Adding Shapes 2

2.1 Lab Overview

In the last lab, we created a map for the icTonics headquarter so that they can view plant locations with views easily. In this lab, we will add in indicators on those locations. This will allow people at headquarter to easily identify plants that are having problems.

Estimated time to complete this lab: 20 minutes

2.1.1 Task Checklist

In this lab, you will complete the following tasks:

- Add a Pushpins
- Associate OPC DA data to each Pushpin
- Associate an alarm to a Pushpin

2.1.2 Support Files

You will need the following files to complete this lab:

- icTionicsPlantInformation.gdfx

2.2 Adding Shapes to a Map

In order for the map that we created in the previous lab to be useful, we will need to add some shape to it to show the status of data.

1. Open the icTonicsPlanInformation.gdfx in the Workbench if you closed it from the previous lab.

2. Browse to your Foxboro Plant view and add a Pushpin on top of the building by right-clicking on it, and select Add Shape → Pushpin.

3. Name this Pushpin "Foxboro Plant" and click on the Image URL dropdown list to select the yellow star. Your finished Main tab should look similar to Figure 2.1.

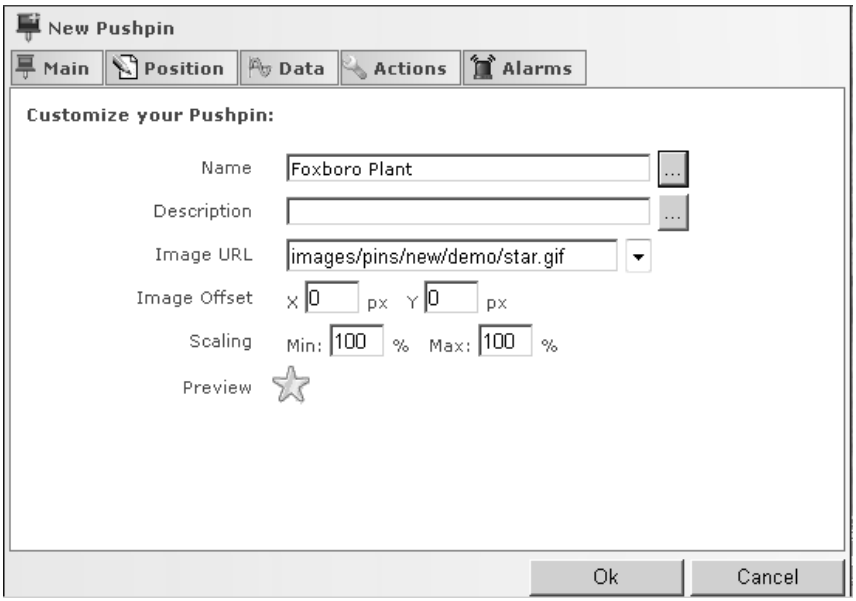

Figure 2.1 - Pushpin Properties: Main Tab

4. Select the Data tab and click on the Add new Data Source link. Select the PlantStatus tag for Foxboro in the Data Browser and click OK to close it.

5. Click on the Actions Tab and change the Pick Action to "Select a View".

6. In the dropdown list to choose a view, select the "Foxboro Plant" view.

7. Go to Alarms tab and click on the Add Subscription link. Remove the Local Alarm Server event end point by selecting it and click on the remove button.

8. Add an event end point by clicking on the add button. In the Data Browse, go to the Foxboro Plant area and click on OK until you are back in the Alarms tab.

> **NOTE**: You should check that you are using the EarthWorX64 Training Alarms configuration in the AlarmWorX64 configurator. If you are not using this configuration, you may not have the alarms that you need.

9. Click on the edit states button of the new alarm you just added.

10. Change the title of the state to “Foxboro Plant Down” and click on the Apply link. You can click on OK to exit the configuration dialog.

11. Your map should now look like Figure 2.2.

Figure 2.2 - Pushpin for the Foxboro Plant

12. You can go into runtime and trigger the alarm to see that the icon changes from a start to the alarm image.

13. Repeat the above steps for the Czech and China plants. A quick way to do this would be to duplicate the Pushpin on these two locations and then change the data sources.

14. Your finished, the map on a global level will look like Figure 2.3.

Figure 2.3 - icTonics Plant Information Display on the Global Level

15. Feel free to turn on different alarms and try to zoom into the plant location with an active alarm.

Shapes Review *R2*

2.1 Objectives Review

After completing this chapter, you should know how to:

- Work with the different shapes that are available
- Configure shapes on the map
- Associate OPC data to your shapes
- Associate Alarms to your shapes
- Define actions for your shapes
- Use GPS data to locate your assets

2.2 Summary

EarthWorX64 allows you to map assets using several different shapes. You can use a **pushpin** to identify a specific asset, or a **textpin** that shows a text box instead. A **SmartPin** shape allows you to monitor several factors at once as part of a multi-celled object.

Shapes are defined in the shape's properties dialog box. Most of the tabs are the same for all kinds of shapes, however the Main tab displays options based on the shape you are configuring. Information that you enter in the Main tab is displayed in the information box for a shape. You can edit many properties of a shape in the dialog using the different tabs.

You can add as many shapes as you need, and editing them is easy. A shape can be connected to live data for the asset it represents. It is also possible to give a shape an action so that it performs a task when activated. Typically, an action is triggered when a runtime user holds down the **Alt** key while clicking on the shape, but you can customize this to use the **Shift** or **Ctrl** key. You can also make it not use a key in conjunction to clicking on the shape as well.

A shape can also be associated with an alarm so that when the alarm occurs the shape reacts by alerting you about changing condition. Associating GPS data with a shape allows the shape to move on the map so that you can track movable assets, like planes, ships, and trucks.

2.3 Terms

Alarm Action	Asset	Decluttering
GPS	KPI	Pick Action
Pushpin	Shape	Smart Icon
Smartpin	Textpin	

2.4 Test Your Knowledge

In this chapter, we discussed how to add shapes to EarthWorX64 maps. Before continuing to the next chapter, make sure you can answer the questions below:

1. Which are the shapes you can add to an EarthWorX64 map?

    a. Roadpin
    b. Pushpin
    c. Textpin
    d. Alarmpin
    e. Smartpin
    f. GPSpin
    g. All of the above
    h. Only A, B, and C
    i. Only B, C, and D
    j. Only B, C, and E
    k. Only B, C, and F
    l. None of the above

2. What is the difference between a pushpin and a textpin?

    a. A pushpin is represented by an icon and a textpin is represented by a textbox
    b. A pushpin has cells and a textpin is a tooltip
    c. A pushpin is used in lower zoom levels while a textpin is used in higher zoom levels
    d. All of the above

3. Which shape graphically displays asset detailed information at a glance?

    a. The Textpin's digitally-enhanced voice system pages the onsite operator
    b. The Pushpin automatically zooms to an asset in an alarm state
    c. The SmartPin's cells can be arranged in a meaningful way so that the meanings of color changes and blinking in the cell pattern are immediately known to the operator
    d. All of the above
    e. None of the above

4. Can you modify a shape after it has been added to the map?

    a. Yes, right-click it and choose Edit
    b. Yes, double-click it to launch a script editor
    c. Yes, drag the shape into a work area to make changes
    d. No, but you can delete it and re-create it

5. What type of information that can be associated to a shape?

    a. Live data coming from an OPC server
    b. Static information
    c. Alarms
    d. All of the above
    e. None of the above

6. You can configure the Pick action for any shape so that runtime users can do which of the following by clicking the shape at runtime?

    a. Write a value to the data source
    b. Open a GraphWorX64 display
    c. Open a view
    d. Launch a web page
    e. Open a document
    f. Launch an application
    g. All of the above
    h. None of the above

7. In what ways can you display movable assets on the map?

    a. Video tracking and geographical data coming from an OPC server
    b. GPS and geographical data coming from an OPC server
    c. GPS and video tracking
    d. All of the above
    e. None of the above

8. True or False: You can configure a shape in EarthWorX64 so that runtime users can launch the *Calculator* by clicking on the shape.

Glossary

Alarm Action is an action that is performed when an alarm condition occurs. You can configure this option in the Edit State properties dialog in the alarms tab of a shape's properties.

Asset is a physical object that you want to monitor or gain *KPI* information from to get better performance.

Decluttering is a method used to see different amount of information in different zoom levels. For example, in wider perspectives of a map, objects clustered in one area on a map can overlap, causing confusion for users. It is possible to use one shape to represent a cluster of shapes in lower zoom levels (which span a wider geographical area), instead of the overlapping cluster of shapes that users see in higher zoom levels (at closer, more detailed perspectives of the map).

EarthWorX64 is an ICONICS product that unleashes the power of *Microsoft Virtual Earth* to provide mapping capabilities to GENESIS64.

EarthWorX64 Pad is a small menu tool provided by *EarthWorX64* that contains common *EarthWroX64* features.

GPS stands for Global Positioning System, which is a navigational device that EarthWorX64 makes use of by allowing you to configure a shape on a map to track the GPS device's location.

KPI stands for Key Performance Indicator, which is an overall measure of a process's efficiency.

Microsoft Virtual Earth is a technology from Microsoft that provides detailed mapping capabilities to most of the world's locations, as well as a Bird's eye imagery captured by low-flying planes.

Pick Action is an action associated with a shape that is performed when a runtime user triggers it.

Pushpin is a simple, customizable icon that identifies an asset on a map. Compare Pushpins to *Textpins* and *Smartpins*.

Shape is an object that you can place on the map. A shape can be a textpin, a pushpin, or a Smartpin.

Smartpin is a multi-celled object, composed of *Smart Icons*, that identifies an asset on a map. Each cell in a Smartpin can be assigned a color and other properties that identify the status of an asset at that location. Compare Smartpins to *Textpins* and *Pushpins*.

Smart Icon is one cell of a multi-celled *Smartpin*. Each Smart Icon in the *Smartpin* represents a single data point, such as one vital organ monitor on a patient, and reacts to data changes by changing color and/or blinking.

Textpin is a text box that identifies an asset on a map. Compare Textpins to *Pushpins* and *Smartpins*

View in terms of *EarthWorX64*, is a saved image of map in which you can return to at any time.

Answers

Questions / Chapters	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Chapter 1	G	B	D	E	False	True	False			
Chapter2	J	A	C	A	D	G	B	True		

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