Net API for Ham Radio

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For Today

Mapping
MapPoint
Live Maps
GPS Devices

C#
.Net
Sorry, no LINUX



First Map Application

- Display a Map
- Show Latitude and Longitude of the center of the map
- Pan and Zoom
- Add a Push Pin at the center location

Basic Form



Adding the controls

MapPoint

- Step 1 Add Reference to MapPoint Control Library
- Step 2 Add MapPoint Control the ToolBox
- Step 3 Add the control to the form
- Step 4 Initialize the control

Live Maps

- Step 1 Add Web control
- Create Map Web Page
 - Add the web page to the Project
 - Reference the VE Map Control
 - Scripts to control the map
- <browser>.Document
- HtmlDocument.InvokeScript()
- Windows.external.<function>

MapPoint Events

Event	Description			
AfterRedraw	Occurs when MapPoint is finished repainting the map on the screen			
AfterViewChange	Occurs when the view of the map has changed and the map is done repainting to that viewpoint			
BeforeClick	Occurs after the user clicks on the map but before MapPoint has processed the action.			
BeforeDblClick	Occurs after the user double-clicks on the map but before MapPoint has processed the action			
DataMapChange	Occurs after data mapping properties are changed for a data set			
MouseDown	Occurs when a mouse button is pressed while the pointer is over the map			
MouseMove	Occurs when the mouse is moved while the pointer is over the map			
MouseUp	Occurs when a mouse button is released while the pointer is over the map			
NewDataSet	Occurs after a new data set is created			
ReadyStateChange	This event occurs when the state of the MapPoint Control has changed			
RouteAfterCalculate	Occurs after the route has been calculated			
RouteAfterOptimize	Occurs after the stops on the route have been optimized			
SelectionChange	Occurs when a selection on the map changes			

Live Map Events

Event	Description
onchangeview	Occurs whenever the map view changes.
onclick	Occurs when the user clicks on the map.
oncontextmenu	Occurs when the user right-clicks on the map
onendcontinousspan	Occurs when a pan of the map ends.
onendzoom	Occurs when the map zoom ends.
onerror	Occurs when there is a map control error
onchangemapstyle	Occurs when the map style changes
onLoadMap	Occurs when the map is first loaded
onmouseup	Occurs when the user releases a mouse click on the map
onobliquechange	Occurs only when the bird's eye image scene ID is changed. This event fires only if the map is currently displaying a bird's eye image and that image is changed.
onobliqueenter	Occurs when switching to bird's eye imagery from another map style.
onobliqueleave	Occurs when switching from bird's eye imagery to another map style.
onresize	Occurs when the map is resized.
onstartcontinousspan	Occurs when a pan of the map begins.
onstartzoom	Occurs when the map zoom begins.

Thing you should know about MapPoint

- MapPoint and Streets and Tips use the same data. To update
 MapPoint use latest
 Streets and Tips data.
 - Program Files/ Microsoft
 Streets & Tips/Data =>
 Program Files/Microsoft
 MapPoint/Data
- You change altitude to zoom the map.*

Zoom effects Pan

 MapPoint uses a COM interface, you need to Start and Unload the MapPoint application*

- MapPoint Control Events
 - BeforeClick
 - BeforeDoubleClick

Things you should know about Live Maps

Latest version is 6.0

 There were major changes between 4.0 and 5.0, making them incompatible

More Info at

- http://msdn2.microsoft.com/enus/library/bb429619.aspx
- <u>http://dev.live.com/virtualearth/sdk/#</u>

IE 6/7 on XP requires -<html xmlns="http://www.w3.org /1999/xhtml">

Page header defines map

- Body <div> element contains the map
- Events are linked to script functions
 - VEMap.AttachEvent(event, function);

Panning and Zooming

MapPoint

- Zooming is controlled by setting altitude (in miles)
- Panning is controlled by the PanFactor, Direction.
 - PanFactor of 1 at 1mi altitude
 = 0.2 miles, at 50 mi = 10 miles
 - Direction is controld by GeoPanCmd enumerator
 - For uniform panning, multiply altitude by 4.88568304395
- ActiveMap.Pan(direction, panFactor)

Live Maps

- Zooming in controlled by the zoom factor (value 1-19)
- Panning is controlled by the number of pixels to move
- VEMap.Pan(dX, dY)
- VEMap.PanToLatLong(VELatLong)
- VEMap.ZoomIn()
- VEMap.ZoomOut()
- VEMap.SetCenterAndZoom(VELatLong, zoom)

Things you should know about WebBrowser Control

- Adds a IE Browser to vour app
 - your app
- WebBrowser.Document
 - -> HtmlDocument

 window.external.<method>
 WebBrowser.Document. InvokeScript()

MapPoint MAPPOINT DEMO 1

Starting the Map

```
private void EnsureMapPointApplication()
```

```
centerPosition.IsMapPoint = true;
if (this.app == null)
```

Stopping

Finding the Center

private void locateCenter()

int cX, cY; cX = app.ActiveMap.Width / 2; cY = app.ActiveMap.Height / 2; MapPoint.Location location = app.ActiveMap.XYToLocation(cX, cY); centerPosition.SetPosition(location.Latitude, location.Longitude); centerPosition.UpdateLabels(txtLatitude, txtLongitude, txtZoom);

MapPoint **LIVE MAP DEMO 1**

HTML Header ...

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<html xmlns="text/html; charset=utf-8"/>
</script/dev.virtualEarth</td>

strip ="text/javascript"

strip = "text/css" media="screen">
```

```
</html>
```

Starting the Map

```
function startVE(width_a, height_a, lat_a, lon_a, zoom_a)
{
    if (map == null)
    {
        map = new VEMap('myMap');
        map.LoadMap(new VELatLong(47.6, -122.33),
            zoom_a, 'r', false);
        map.AttachEvent("onendcontinuouspan", update_map_position);
        map.AttachEvent("onendzoom", update_view_position);
        map.AttachEvent("onendzoom", update_map_zoom_level);
        map.AttachEvent("onclick", scroll_to_mouse);
        window.external.scriptLoadCompleted();
    }
}
```

Linking C# to Scripts

private const string ZoomInScript = "zoomIn"; private const string ZoomOutScript = "zoomOut"; private const string PanScript = "pan"; private const string RemovePushpinScript = "removePushpin"; private const string AddPushpinScript = "addPushpin"; private const string FindAddressLocation = "findAddress"; private const string FindWhatWhereLocation = "findLocation"; private const string SetMapStyleScript = "setMapStyle"; private const string ResizeScript = "resize"; private const string ClearPushpinsScript = "clearPushpins"; private const string StartVE = "startVE"; private const string SetCenterAndZoom = "setCenterAndZoom"; private const string SetCenterPosition = "setCenterPosition"; private const string SetZoomLevel = "setZoom"; private void executeScript(string scriptName, params object[] parameters) virtualEarthMapBrowser1.Document.InvokeScript(scriptName, parameters) }

FINDING THINGS

Find Function

MapPoint

- FindPlaceResult(name)
- FindAddressResult(street,city ,othercity, region, postalcode, country)
- FindNearby(distance)
- FindResult(name)
- FindPushPin(name)

Live Maps

- VEMap.Find(what, where, type, index, num results, showResults, createResults, useDefaultDisambigous, setBestView,callback)
- Callback receives 5 parameters
 - callback(shapeLayer, findResult, place, more, error)

Find/Geo-Coding

Available functions.

 VEMap.Find(what, where, type, index, num results, showResults, createResults, useDefaultDisambigous, setBestView,callback);

VEMap.Find() returns a results object and map for all.

To get geo-coded results use map.GetCenter()
CallBack – callback(shapeLayer, findResult, place, more, error)

Second Map Application

Map a set of locations
Map a file of Latitude and Longitude
Map a file of addresses
Exporting Pin Locations
Map a set of findu locations

MapPoint **LIVE MAP DEMO2**

GPS DEVICE





GPS Devices

USB Serial Devices

Use the .Net SerialPort

Devices usually are

- Low Power Consumption
- 8 parallel satellite-tracking channels for fast acquisition and reacquisition
- Support for true NMEA-0183 data protocol
- Enhanced algorithms provide superior tracking performance in urban, canyon, and foliage environments
- Maximum navigation accuracy achievable with the Standard Positioning Service (SPS)
- Meets rigid shock and vibration requirements
- Automatic altitude hold mode from three-dimensional to two-dimensional navigation
- Automatic cold start acquisition process
- Built-in Antenna

NEMA Sentences Type

Туре	Description
GPAPB	Auto Pilot B
GPBOD	bearing, origin to destination - earlier G-12's do not transmit this
GPGGA	fix data
GPGLL	Lat/Lon data - earlier G-12's do not transmit this
GPGSA	overall satellite reception data, missing on some Garmin models
GPGSV	detailed satellite data, missing on some Garmin models
GPRMB	minimum recommended data when following a route
GPRMC	minimum recommended data
GPRTE	route data, only when there is an active route. (this is sometimes bidirectional)
GPWPL	waypoint data, only when there is an active route (this is sometimes bidirectional)

NEMA Sentence

\$GPGGA,213326.000,5343.3606,N,00641.2233,W,1,05,3.9,88.0,M,055,M,,*69 \$GPGSA,A,3,07,20,25,04,11,,,,,4.7,3.9,2.5*3A \$GPGSV,2,1,08,07,47,283,37,11,50,124,33,14,13,035,,20,84,203,35*71 \$GPGSV,2,2,08,01,28,170,,28,06,243,,25,13,080,34,04,12,290,36*76 \$GPRMC,213326.000,A,5343.3606,N,00641.2233,W,0.0,0.0,291203,08.5,W*58

Sentence Type

Checksum

Position Sentence (GPGGA)

\$GPGGA,123519,4807.038,N,01131.000,E,1,08,0.9,545.4,M,46.9,M,,*47

Where:

GGA Global Positioning System Fix Data Fix taken at 12:35:19 UTC 123519 4807.038,N Latitude 48 deg 07.038' N 01131.000,E Longitude 11 deg 31.000' E Fix quality: 0 = invalid 1 = GPS fix (SPS)2 = DGPS fix 3 = PPS fix4 = Real Time Kinematic 5 = Float RTK6 = estimated (dead reckoning) (2.3 feature)7 = Manual input mode 8 =Simulation mode Number of satellites being tracked Horizontal dilution of position 545.4,M Altitude, Meters, above mean sea level 46.9,M Height of geoid (mean sea level) above WGS84 (empty field) time in seconds since last DGPS update (empty field) DGPS station ID number the checksum data, always begins with *

Converting Lat/Lon

Format is ddmm.mmmD -> need ±dd.dddddd
Where D is N = North, S = South, E = East, W = West
x = ((int)(x / 100.0)) + ((x - (((int)(x / 100.0)) * 100)) / 60);

GPS RECEIVER DEMO

References

Slide 123
<u>http://www.ku7m.net</u>
Slide 456
<u>http://www.arrl.org</u>

Resources

- Check out Virtual Earth for yourself: <u>www.virtualearth.com</u>
- Interactive SDK: <u>http://dev.live.com/virtualearth/default.aspx?app=v</u> <u>irtual_earth</u>
- Microsoft MapPoint Developer Center <u>http://msdn.microsoft.com/mappoint/</u>
- Virtual Earth for Government Home Page <u>http://www.microsoft.com/virtualearth/governmen</u> <u>t/default.mspx</u>

• Virtual Earth For Gov't Blog: http://virtualearth4gov.spaces.live.com/ Extending an ESRI investment with Microsoft Virtual Earth http://msdn.microsoft.com/mappoint/mappointwe <u>b/mappointwstechart/default.aspx?pull=/library/en</u> -us/dnmapnet30/html/ESRI_MWS.asp <u>ViaVirtualEarth</u>: Info for developers who want to integrate VE into their own applications <u>Birds Eye Tourist</u>: Catalog of nice BE maps

Resources

•<u>Pass The POI</u>: Share your WLL collections with the world or browse the creations of others

maplic@microsoft.com to contact a Microsoft Virtual Earth Solution Specialist for more information and assistance

<u>http://www.viavirtualearth.com</u> - Community site with great articles and examples, blogs, etc.

Resources

 <u>blogs.msdn.com/virtualearth/</u> - A VE developer blog with updates and tips
 <u>http://heptazane.spaces.live.com/</u> (David Buerer) - How to host the VE3D managed control in a desktop app (UNSUPPORTED)



Adding MapPoint Library DLL to your project

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Adding a Group to the Toolbox

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Adding the MapPoint Control to the tool box

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Displaying a Live Map

- At the top of the HTML page add the following DOCTYPE declaration.
 - <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
- In the header section of an HTML page, add a META element with the **charset** attribute set to **"utf-8"**, as follows.
- Also in the header section, add a reference to the map control, as follows.
 - script type="text/javascript"
 src="http://dev.virtualearth.net/mapcontrol/mapcontrol.ashx?v=6"> </script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script></script><
- In the body of the page, add a DIV element to the page to contain the map. The size of the map is defined by the height and width of the DIV element. The position of the map is set by using the "position", "top", and "left" properties. You can set these values either inline or by defining the values in a style class and then referencing that class, as follows.
 - <div id='myMap' style="position:absolute; width:400px; height:400px;"></div>
- Create a new instance of the <u>VEMap Class</u> and call the <u>VEMap.LoadMap Method</u>, as follows.
 - var map = new VEMap('myMap'); map.LoadMap();