

## NYS GIS Program Office Geocoding Services

Last Updated: 1/3/2014

### Background

Geocoding is the process where an input address, either manually input or bulk input from a database or other source, is transformed into a consistent standardized address and a coordinate pair location. While there is only one authoritative way of storing an address using the FGDC Address Standard (<https://www.fgdc.gov/standards/projects/FGDC-standards-projects/street-address>), many different people may enter their address differently. The NYS GIS Program Office has tried to allow for as much flexibility as possible in entering addresses which can result in an FGDC standardized address and coordinate pair location. We do this by incorporating multiple versions of address locators into multiple composite locators.

Now that the SAM project (see: <http://www.dhSES.ny.gov/ocs/streets/>) is underway and the GIS Program Office has rooftop address points in many counties, we have incorporated these authoritative address points into the composite locators. We have also added additional address locators to improve geocoding results. These locators have been optimized for speed and flexibility to return the most accurate and standardized results as often as possible. To increase the speed of geocoding addresses and also maintain the flexibility and improved results of having multiple locators within the composite, the GIS Program Office split the locators into several separate composite locators. The intent is that by geocoding against the separate composite locators in a specific sequence the best result is achieved.

For example, the first composite locator (SAM\_ZipName\_Composite) is made up of the following list of locators. The locators are listed in the order from best to least quality along with a brief description of the locator's source data. These six locators will generate the majority of the results when geocoding addresses.

### GIS Services

The composite locators are available as web services through the following links:

#### Updated Composite Locators:

*SAM\_ZipName\_Composite*

[http://gisservices.dhSES.ny.gov/arcgis/rest/services/Locators/SAM\\_composite/GeocodeServer](http://gisservices.dhSES.ny.gov/arcgis/rest/services/Locators/SAM_composite/GeocodeServer)

*Fallback\_Locators\_Composite*

[http://gisservices.dhSES.ny.gov/arcgis/rest/services/Locators/fallback\\_composite/GeocodeServer](http://gisservices.dhSES.ny.gov/arcgis/rest/services/Locators/fallback_composite/GeocodeServer)

## Developers

Developers coding against the web service should include code which returns the best response from the results returned. The locaters are numbered in the order of spatial quality. Match score should not be used to choose a result form the many that may be returned. SAM points are preferred over Navteq points, which are preferred over street segments, and so on. These locaters are designed to only return valid hits, so the actual match score is of little consequence.

Sample code included here shows the logic used in picking the best result from among the geocoding results of the multiple compound locaters. This code is a fully functioning html page.

```
<!DOCTYPE html>

<html>

<head>

  <meta name="viewport" content="initial-scale=1, maximum-scale=1, user-scalable=no">

  <title>Geocoder Example</title>

  <link rel="stylesheet" href="http://js.arcgis.com/3.8/js/dojo/dijit/themes/claro/claro.css">

  <link rel="stylesheet" href="http://js.arcgis.com/3.8/js/esri/css/esri.css">

  <style>

    #container {

      width: 647px;

      margin: 20px auto;

    }

    #map {

      width: 647px;

      height: 400px;

      margin-top: 5px;

      border: 2px solid #666;

    }

  </style>

</head>

</html>
```

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```
#address-input {  
    width: 350px;  
}  
</style>  
  
<!-- ArcGIS JS reference guide: https://developers.arcgis.com/en/javascript/jsapi/ -->  
<script src="http://js.arcgis.com/3.8/"></script>  
<script src="http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.min.js"></script>  
</head>  
<body class="claro">  
    <div id="container">  
        <form onSubmit="return false;">  
            <input type="text" id="address-input" value="99 Washington Ave, Albany, 12210" />  
            <button id="search-btn">Search</button>  
        </form>  
  
        <div id="map"></div>  
  
        <div id="search-results"></div>  
    </div>  
</body>  
</html>  
  
<script type="text/javascript">  
    var fallback = false; //has the fallback locator been searched  
    var map, bestCandidates;  
  
    require(
```

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```
[
    "esri/graphic",
    "esri/symbols/SimpleMarkerSymbol",
    "esri/tasks/locator",
    "esri/map",
    "dojo/domReady!"
],
function(
    Graphic,
    SimpleMarkerSymbol,
    Locator,
    Map
) {
    //Call the searchInit function when the search button is clicked
    $('#search-btn').click(searchInit);

    var initExtent = new esri.geometry.Extent({"xmin":-82.743, "ymin":39.634, "xmax":-68.527,
"ymax":46.068, "spatialReference":{"wkid":4326}});

    //Initialize the map
    map = new Map("map", {
        basemap: "gray",
        extent: initExtent,
        logo: false,
        showAttribution: false
    });

    function searchInit() {
        //Clear previous results
```

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```
        fallback = false;

        $('#search-results').html("");

        map.graphics.clear();

        addressSearch($('#address-input').prop('value'));
    }

function addressSearch(street) {

    //Build query to be sent to the geocode service

    if(fallback == false) {

        var locator = new
Locator("http://gisservices.dhSES.ny.gov/arcgis/rest/services/Locators/SAM_composite/GeocodeServer");

    }

    else {

        var locator = new
Locator("http://gisservices.dhSES.ny.gov/arcgis/rest/services/Locators/fallback_composite/GeocodeServer");

    }

    locator.on("address-to-locations-complete", displayAddressResults);

    locator.on("error", searchError);

    var address = { "SingleLine" : street };

    locator.outSpatialReference = map.spatialReference;

    locator.addressToLocations(address, ['Loc_Name']);

}

//Callback function of the geocoding services

//prints out any results found, otherwise it displays the no results found message.

function displayAddressResults(candidates) {
```

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```
/*
```

```
    Candidate JSON format example:
```

```
    [
      {
        address: '99 Washington Ave Albany NY 12210',
        attributes:
          {
            Loc_Name: '2A_AP_ZipName'
          }
        location:
          {
            x: -8210815.270441663,
            y: 5259598.5370621765
          }
        score: 100
      }, ...
    ]
```

```
*/
```

```
//Find the highest scoring candidate(s) from the best locator
```

```
bestCandidates = findBestCandidate(candidates.addresses);
```

```
if(bestCandidates.length == 0 && fallback == false) { //If the SAM locator doesn't return  
any results, search the fallback locator
```

```
    fallback = true;
```

```
    addressSearch($('#address-input').prop('value'));
```

```
    }
```

```
either locator
```

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```
        $('#search-results').html('No Addresses Found');
    }
    else {
        if(bestCandidates.length == 1) { //If there is only one result, zoom to it
            showPoint(0);
        }
        else { //If there are multiple results print them all out
            for(var i in bestCandidates) {
                $('#search-results').append('<a href="#"
onClick="showPoint(' + i + ')">' + bestCandidates[i].address + '</a><br />');
            }
        }
    }
}

//Finds the best possible candidate or set of candidates
function findBestCandidate(candidates) {
    var validCandidates = [];
    var highScore = { score: 0, type: "99" };

    for(var i in candidates) {
        var locactor_id = candidates[i].attributes.Loc_Name.split('_')[0];

        //Take the highest scoring candidate. Candidate order of precedence is
        determined by the first two characters of the Loc_Name attribute.

        //1A being the highest, followed by 1B, 2A, 2B....
        if(candidates[i].score >= highScore.score) {
            if( locactor_id <= highScore.type ) {
                candidates[i].location.points = [ [candidates[i].location.x,
candidates[i].location.y] ];
            }
        }
    }
}
```

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```
        validCandidates.push(candidates[i]);

        highScore = { score: candidates[i].score, type: locator_id
};

        }

    }

}

return validCandidates;

}

function searchError(error) {
    console.log(error);
}

});

//Add a point graphic to the map for i in bestCandidates and zoom to it
function showPoint(i) {
    //Clear previous point
    map.graphics.clear();

    //Add new point graphic to the map

    var symbol = new
esri.symbol.SimpleMarkerSymbol().setStyle(esri.symbol.SimpleMarkerSymbol.STYLE_DIAMOND).setColor(new
dojo.Color([245,122,0,1]));

    var pointGraphic = new esri.Graphic(bestCandidates[i].location, symbol, {}, false);

    map.graphics.add(pointGraphic);

    //Zoom to the point

    map.centerAndZoom(bestCandidates[i].location, 15);

}
```

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</script>