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Introduction to MainSpace

MainSpace is Mainframe Cloud's agile DevOps solution for IBM's System Z.

MainSpace allows web app developers to build applications for the mainframe in web languages such as JavaScript and HTML5. Users have the flexibility to utilise third party graphical user interface (GUI) libraries to create whatever visuals are required.

This release of MainSpace supports a DB2 Interface.

The MainSpace Getting Started section will guide you through creating simple Apps.

MainSpace Getting Started Guide

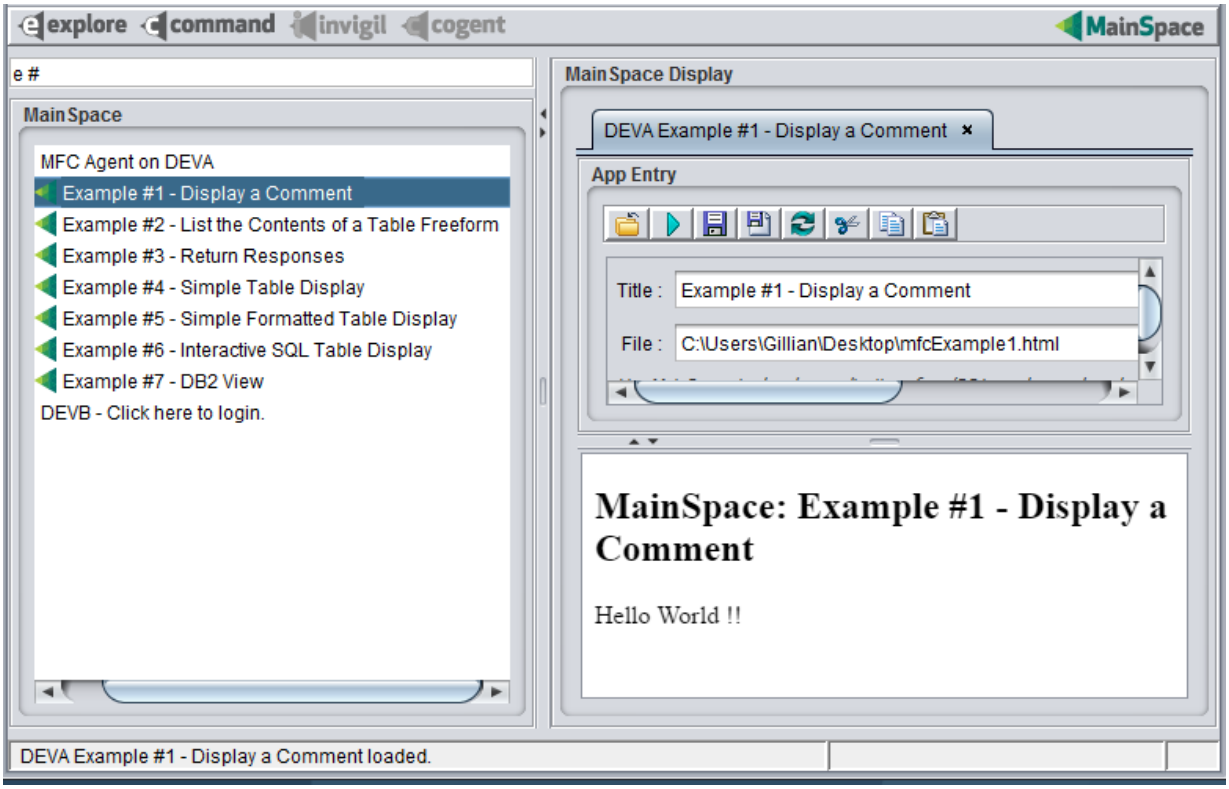
The examples below guide you step by step through the process of writing MainSpace Apps. The Examples are located on the Mainframe Cloud website at the links provided in each example below.

Example #1 – Display a Comment

We begin with a simple MainSpace App.

1. Open this **example html File** here and copy the contents.
2. In Notepad create a new file and paste the contents of the above example.
3. Save the file with **.html** extension. (The example is saved to the Desktop as "mfcExample1.html")
4. Login to Mainframe Cloud.
5. Click **MainSpace** product.
6. Create a NEW App (CTRL+N)
7. Specify a Title: Example #1 - Display a Comment
8. Specify a File Location: right click on the field & drill down to where you saved the "mfcExample1.html" file on your desktop.
9. Click Save Icon (CTRL+S)
10. Click Execute Icon (CTRL+F5)
11. You should see a similar display to below in **Expected Display**.

Expected Display after the Execute action



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Example #2 – List the Contents

This example MainSpace App executes a simple SQL statement and displays the return response in a raw freeform dump. Before you start you must know:

DB2 SSID

The up to 4-character z/OS DB2 SSID you wish to interrogate. Specified in this statement: `obj1.setDB2SSID("DBBG");`

DB2 Table

The z/OS DB2 Table you wish to interrogate. Specified in this statement: `obj1.runSQL("SELECT * FROM DSN81110.EMP");`

This example will list the contents of a DB2 table to show the field names and the data.

1. Open this **example html File** here and copy the contents.
2. In Notepad create a new file and paste the contents of the above example.
3. Change the DB2 SSID and the DB2 Table reference to your own values.
4. Save the file with **.html** extension. (The example is saved to the Desktop as "mfcExample2.html")
5. Login to Mainframe Cloud.
6. Click **MainSpace** product.
7. Create a NEW App (CTRL+N)
8. Specify a Title: Example #2 – List the Contents of a Table Freeform
9. Specify a File Location: right click on the field & drill down to where you saved the "mfcExample2.html" file on your desktop.
10. Click Save Icon (CTRL+S)
11. Click Execute Icon (CTRL+F5)
12. You should see a similar display to below in **Expected Display**.

mfcExample2.html – API Call Explained

Referring to the mfcExample2.html sample code let's examine the API Call.

MFCAgentRequest is the class used to perform MainSpace API calls:

```
var obj1 = MFCAgentRequest.newObject();
obj1.callbackFunction = "callBack( thisObject.response );";
obj1.setDB2SSID( "DBBG" );
obj1.runSQL( "SELECT * FROM DSN81110.EMP" );
```

First, create a new object instance to work with:

```
var obj1 = MFCAgentRequest.newObject();
```

Second, nominate the function that is to be executed when the API call is complete.

```
obj1.callbackFunction = "callBack( thisObject.response );";
```

Third, set the API call specific required input fields. We are executing a DB2 SQL query, for this you need to specify the DB2 SSID and the SQL string. The SSID (subsystem identifier) identifies which DB2 region you wish to query.

```
obj1.setDB2SSID( "DBBG" );
obj1.runSQL( "SELECT * FROM DSN81110.EMP" );
```

The **MFCAgentRequest** API call will return data in the 'response' object in JSON format.

The callback function definition specifies a function name "callBack", and the input object to feed to that function.

In this example, the API call returns the response data JSON object which is passed to the callBack function to process/display the result of the API call.

mfcExample2.html – callbackFunction Explained

Referring to the above mfcExample2.html sample code we examine the callbackFunction statement. When the MainSpace API call is complete it will call the specified JavaScript function. The JavaScript function name and input parm(s) were specified in the MFCAgentRequest **callbackFunction** field:

```
obj1.callbackFunction = "callBack( thisObject.response );";
```

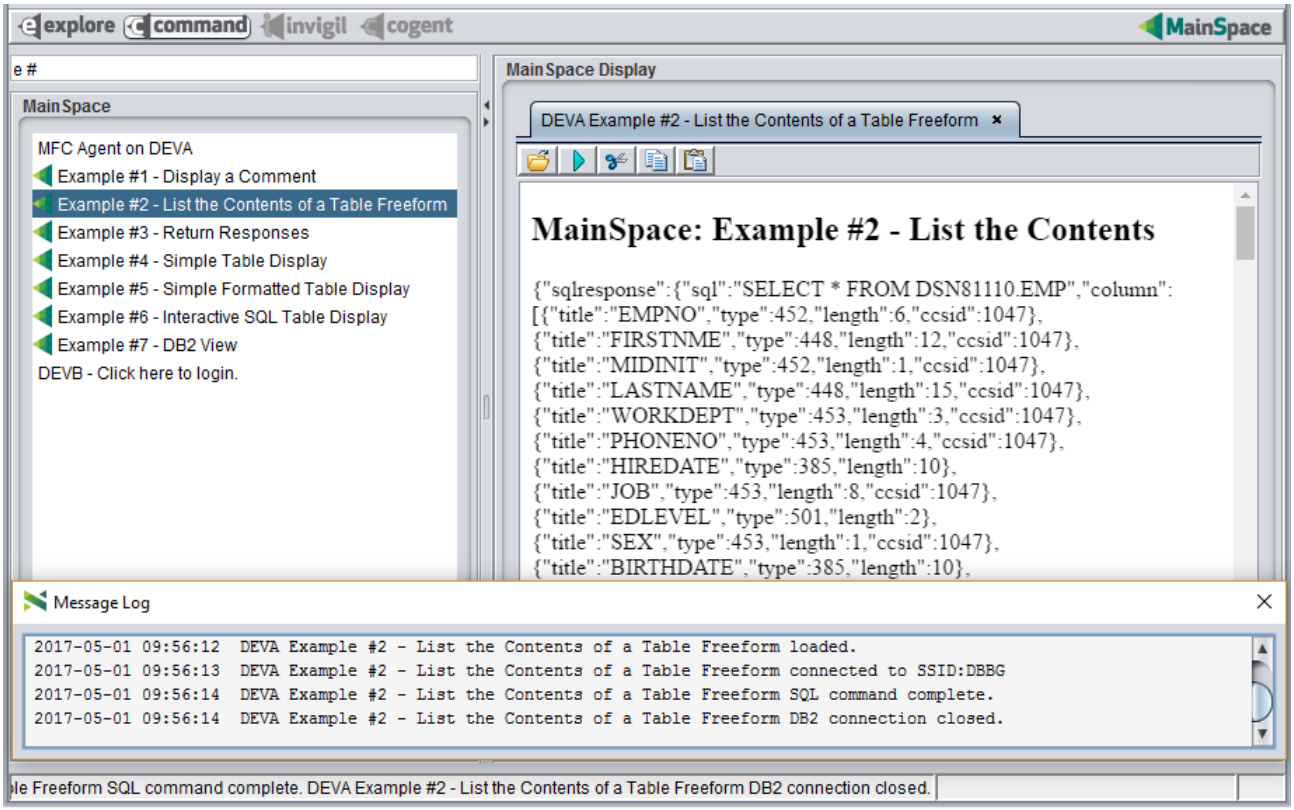
This is the JavaScript function:

```
function callBack( response ) {
    var myJSON = JSON.stringify( response );
    document.getElementById("sample").innerHTML = myJSON;
}
```

This is a very basic function to begin with. It defines local variable 'response', which will be populated by the API call return data. The local variable 'response' can be any valid variable name.

This example converts the JSON object into a raw string, and then populates the web page content with this data. This example app will execute the API call as soon as the App is loaded.

Expected Display after the Execute action



Note: The Message Log displays the actions executed.

Example #3 – Return Responses

This example MainSpace App executes a simple SQL statement and displays a response. Before you start you must know:

DB2 SSID

The up to 4-character z/OS DB2 SSID you wish to interrogate. Specified in this statement: `obj1.setDB2SSID("DBBG");`

DB2 Table

The z/OS DB2 Table you wish to interrogate. Specified in this statement: `obj1.runSQL("SELECT * FROM DSN81110.EMP");`

This example targets some of the fields returned in the response object to provide a more meaningful display. This example allows you to experiment with changing values.

1. Open this **example html File** here and copy the contents.
2. In Notepad create a new file and paste the contents of the above example.
3. Change the DB2 SSID and the DB2 Table reference to your own values.
4. Save the file with **.html** extension. (The example is saved to the Desktop as "mfcExample3.html")
5. Login to Mainframe Cloud.
6. Click **MainSpace** product.
7. Create a NEW App (CTRL+N)
8. Specify a Title: Example #3 – Return Responses
9. Specify a File Location: right click on the field & drill down to where you saved the "mfcExample3.html" file on your desktop.
10. Click Save Icon (CTRL+S)
11. Click Execute Icon (CTRL+F5)
12. You should see a similar display below in **Expected Display**.
13. To observe another message, in your mfcExample3.html, change the value of the SSID to an invalid value. In this example it was changed to "DBBGz".
14. Save your mfcExample3.html and re-execute the App in MainSpace.
15. You should see a similar display below in the second screen shot.

mfcExample3.html – callbackFunction Explained

Referring to the above mfcExample3.html sample code let's examine the callback function. The only change from Example 2 to Example 3 is a more complex callback function to display information about the SQL query issued.

First, construct the message variable if the API call returns a message:

```
// Construct message.
var sqlmsg = '';
if ( typeof response.sqlresp.message != "undefined" ) {
    for ( var i = 0 ; i < response.sqlresp.message.length ; i++ ) {
        sqlmsg = sqlmsg + response.sqlresp.message[i] + '<BR>';
    }
}
```

Second, set the row total:

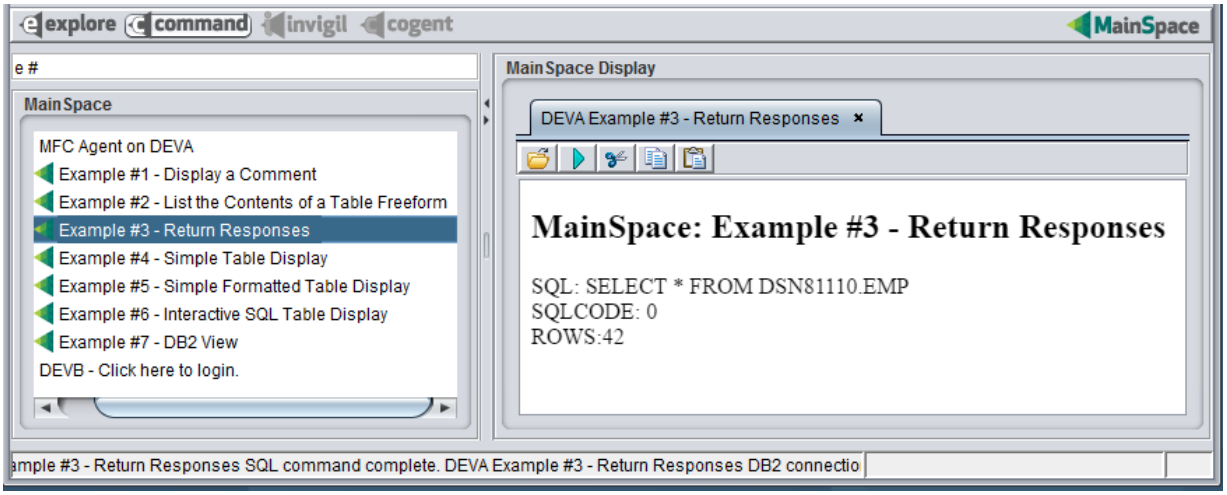
```
// Get row total
var rows = 0;
if ( typeof response.sqlresp.resultset[0].row != "undefined" ) {
    rows = response.sqlresp.resultset[0].row.length;
}
```

Third, display the results:

```
// Display results.
document.getElementById("sample").innerHTML =
    'SQL: '          + response.sqlresp.sql     +
    '<BR>SQLCODE: ' + response.sqlresp.sqlcode +
    ( ( sqlmsg == '' )
      ? ''
      : '<BR><BR>MESSAGE<BR>' + sqlmsg
    ) +
    '<BR>ROWS:' + rows;
```

Expected Display after the Execute action

Expected display when all values are correct.



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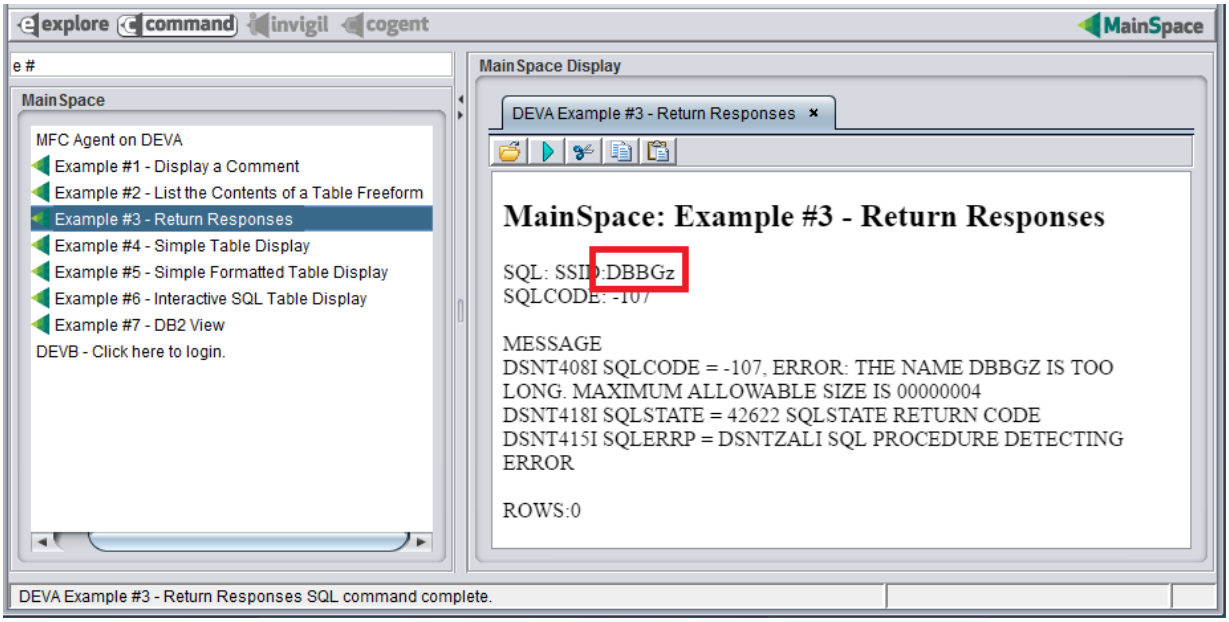
Expected display when the SSID value is incorrect.



Example #4 – Simple Table Display

This example MainSpace App executes a simple SQL statement and displays the output in a table. Before you start you must know:

DB2 SSID

The up to 4-character z/OS DB2 SSID you wish to interrogate. Specified in this statement: `obj1.setDB2SSID("DBBG");`

DB2 Table

The z/OS DB2 Table you wish to interrogate. Specified in this statement: `obj1.runSQL("SELECT * FROM DSN81110.EMP");`

This example displays the SQL query result in a Table:

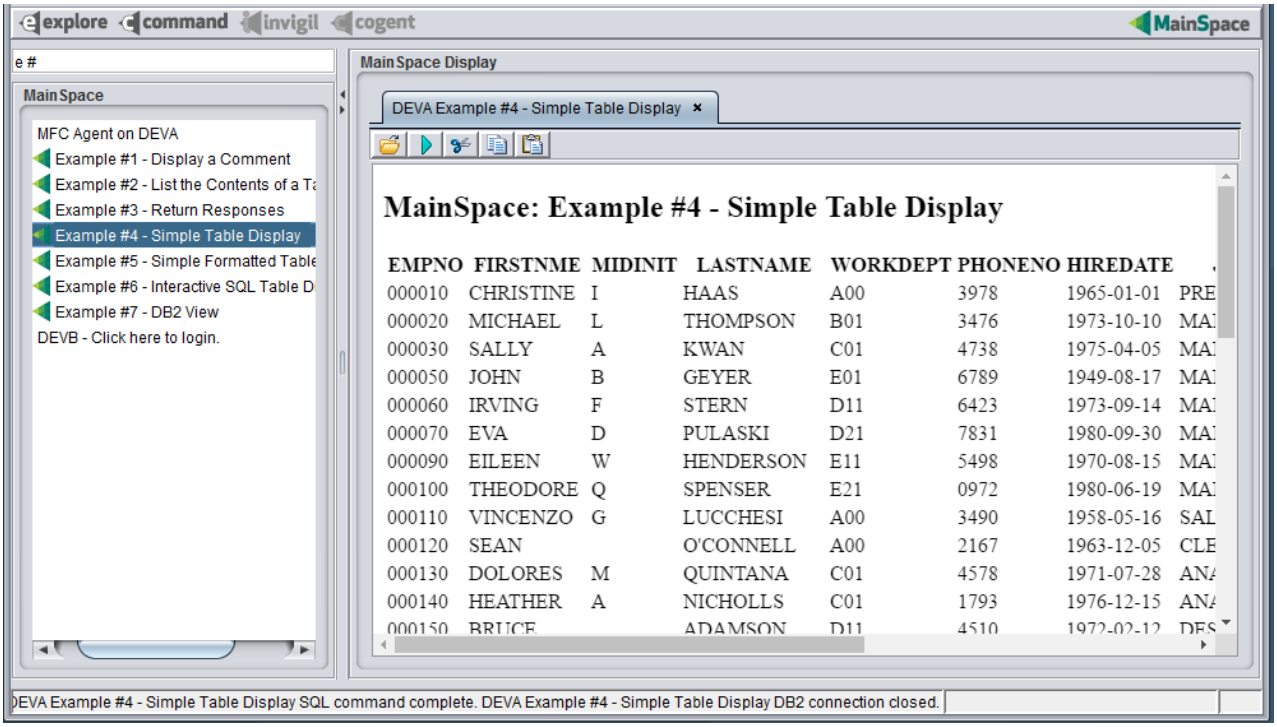
1. Open this **example html File** here and copy the contents.
2. In Notepad create a new file and paste the contents of the above example.
3. Change the DB2 SSID and the DB2 Table reference to your own values.
4. Save the file with **.html** extension. (The example below is saved to the Desktop as "mfcExample4.html")
5. Login to Mainframe Cloud.
6. Click **MainSpace** product.
7. Create a NEW App (CTRL+N)
8. Specify a Title: Example #4 – Simple Table Display
9. Specify a File Location: right click on the field & drill down to where you saved the "mfcExample4.html" file on your desktop.
10. Click Save Icon (CTRL+S)
11. Click Execute Icon (CTRL+F5)
12. You should see a similar display below in **Expected Display**.

mfcExample4.html – callbackFunction Explained

Referring to the mfcExample4.html sample code the only change from Example 3 to Example 4 is an enhanced callback function with some basic JavaScript. The JavaScript function will display a html table populated with the API response data.

```
function callBack( response ) {
    var sqlresp  = response.sqlresp.resultset[0];
    var mfcTable = '<table><tr>';
    for ( var headI = 0; headI < sqlresp.column.length; headI++ ) {
        mfcTable += '<th>' + sqlresp.column[headI].title + '</th>';
    }
    mfcTable += '</tr>';
    for ( var rowI = 0; rowI < sqlresp.row.length; rowI++ ) {
        mfcTable += '<tr>';
        for ( headI = 0; headI < sqlresp.column.length; headI++ ) {
            mfcTable +=
                '<td>' +
                (sqlresp.row[rowI])[sqlresp.column[headI].title] +
                '</td>';
        }
        mfcTable += '</tr>';
    }
    mfcTable += '</table>';
    document.getElementById("sample").innerHTML = mfcTable;
}
```

Expected Display after the Execute action



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Example #5 – Simple Formatted Table Display

This example MainSpace App executes a simple SQL statement and displays the output in a formatted table. This example introduces some basic CSS styling into the html head section of our web page to make our table more readable. Before you start you must know:

DB2 SSID

The up to 4-character z/OS DB2 SSID you wish to interrogate. Specified in this statement: `obj1.setDB2SSID("DBBG");`

DB2 Table

The z/OS DB2 Table you wish to interrogate. Specified in this statement:
`obj1.runSQL("SELECT * FROM DSN81110.EMP");`

This example displays the SQL query result in a formatted Table:

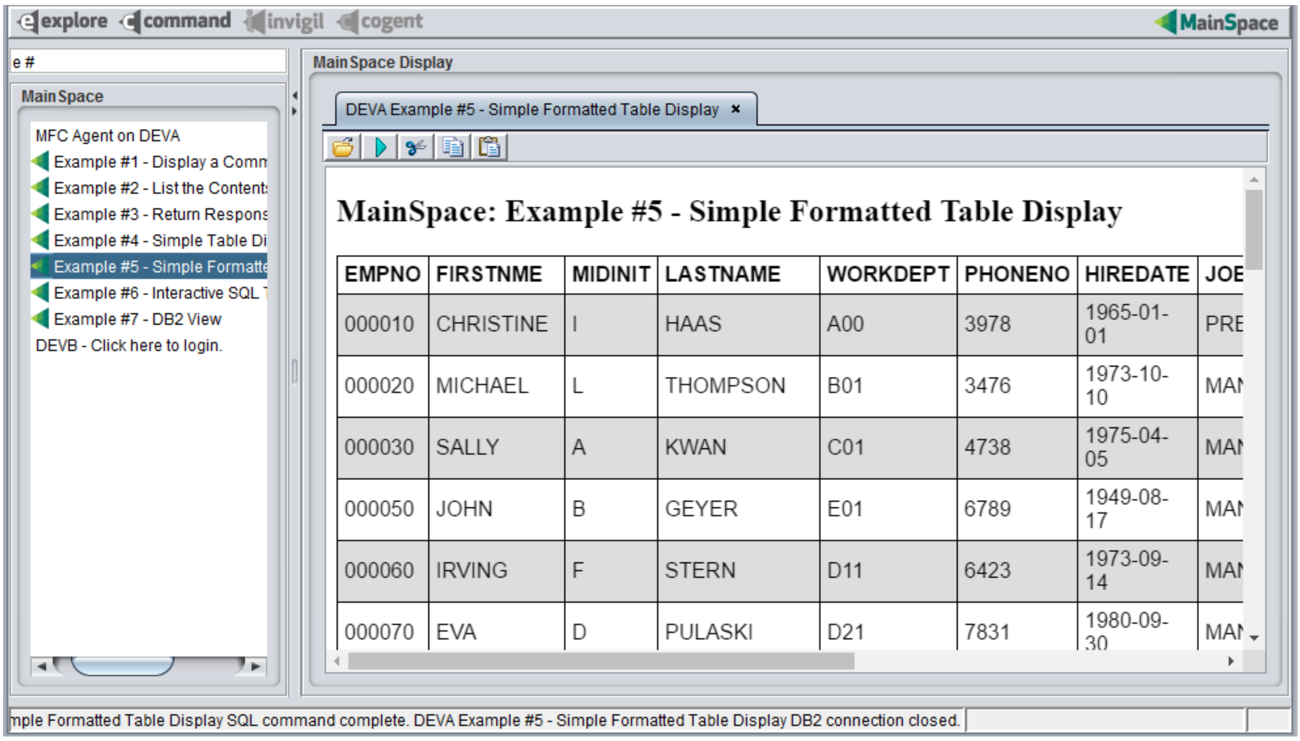
1. Open this **example html File** here and copy the contents.
2. In Notepad create a new file and paste the contents of the above example.
3. Change the DB2 SSID and the DB2 Table reference to your own values.
4. Save the file with **.html** extension. (The example below is saved to the Desktop as "mfcExample5.html")
5. Login to Mainframe Cloud.
6. Click **MainSpace** product.
7. Create a NEW App (CTRL+N)
8. Specify a Title: Example #5 – Simple Formatted Table Display
9. Specify a File Location: right click on the field & drill down to where you saved the "mfcExample5.html" file on your desktop.
10. Click Save Icon (CTRL+S)
11. Click Execute Icon (CTRL+F5)
12. You should see a similar display below in **Expected Display**.

mfcExample5.html – <head> Section Explained

Referring to the mfcExample5.html sample code the only change from Example 4 to Example 5 is the inclusion of some formatting code in the head section of the MainSpace App web file. CSS Styling code has been used as follows:

```
<head>
    <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -->
    <!-- CSS section                                                      -->
    <!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -->
    <style>
        table {
            font-family: arial, sans-serif;
            border-collapse: collapse;
            width: 100%;
        }
        td, th {
            border: 1px solid #000000;
            text-align: left;
            padding: 5px;
        }
        tr:nth-child(even) {
            background-color: #dddddd;
        }
    </style>
</head>
```

Expected Display after the Execute action



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Example #6 – Table Display with 3rd Party Library

This example MainSpace App uses a third-party graphics library to display the output. We therefore do not need the CSS Styling code or the JavaScript table code that was used in Example 5. Before you start you must know:

DB2 SSID

The up to 4-character z/OS DB2 SSID you wish to interrogate. Specified in this statement: `"db2ssid":"DBBG",`

DB2 Table

The z/OS DB2 Table you wish to interrogate. Specified in this statement: `"sql":["SELECT * FROM DSN81110.EMP"]`

This example displays the SQL query result in a formatted 3rd party Table:

1. Open this **example html File** here and copy the contents.
2. In Notepad create a new file and paste the contents of the above example.
3. Change the DB2 SSID and the DB2 Table reference to your own values.
4. Save the file with **.html** extension. (The example below is saved to the Desktop as "mfcExample6.html")
5. Login to Mainframe Cloud.
6. Click **MainSpace** product.
7. Create a NEW App (CTRL+N)
8. Specify a Title: Example #6 – Third Party GUI Table Display
9. Specify a File Location: right click on the field & drill down to where you saved the "mfcExample6.html" file on your desktop.
10. Click Save Icon (CTRL+S)
11. Click Execute Icon (CTRL+F5)
12. You should see a similar display below in **Expected Display**.

mfcExample6.html – <head> Section Explained

Referring to the mfcExample6.html sample code the head section now references the 3rd party graphics libraries as follows:

```
<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -->
<!-- Third party GUI libraries                                            -->
<!-- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -->
<link href="https://www.mainframecloudplatform.com/applibs/fgrid/fancy.min.css"
rel="stylesheet">
<script type="text/javascript"
src="https://www.mainframecloudplatform.com/applibs/fgrid/fancy.full.min.js">
</script>
```

mfcExample6.html – callbackFunction Explained

Referring to the mfcExample6.html sample code the callback function utilises the 3rd party libraries as follows.

First, the column data object returned from the API call must be massaged:

```
// Create column headings object with extracts from response data.
var headings = [];
for ( var i = 0 ; i < response.sqlresp.resultset[0].column.length ; i++ ) {
    headings.push( { index: response.sqlresp.resultset[0].column[i].title,
                     title: response.sqlresp.resultset[0].column[i].title } );
}
```

Second, we code a call to display the data in a table:

- Pass the new heading object created above - **headings**
- Pass the table data object (**response.sqlresp.resultset[0].row**) from the API call.

```
/*
 * Call third party GUI library to display table with the JSON data.
 */
new FancyGrid({
    renderTo: 'container',
    width: 'fit',
    height: 400,
    data: response.sqlresp.resultset[0].row,
    columns: headings
});
```

Notes:

- The table **data** returned from the API call does not require changing as the 3rd party solution accepts the response row data object as is.
- Many 3rd party libraries require different approaches to utilize them, but the majority accept data in JSON format. In this example we did not need to change the row data object.
- For more information on how to use the 3rd party library in this example refer to https://fancygrid.com/ and click the documentation link.

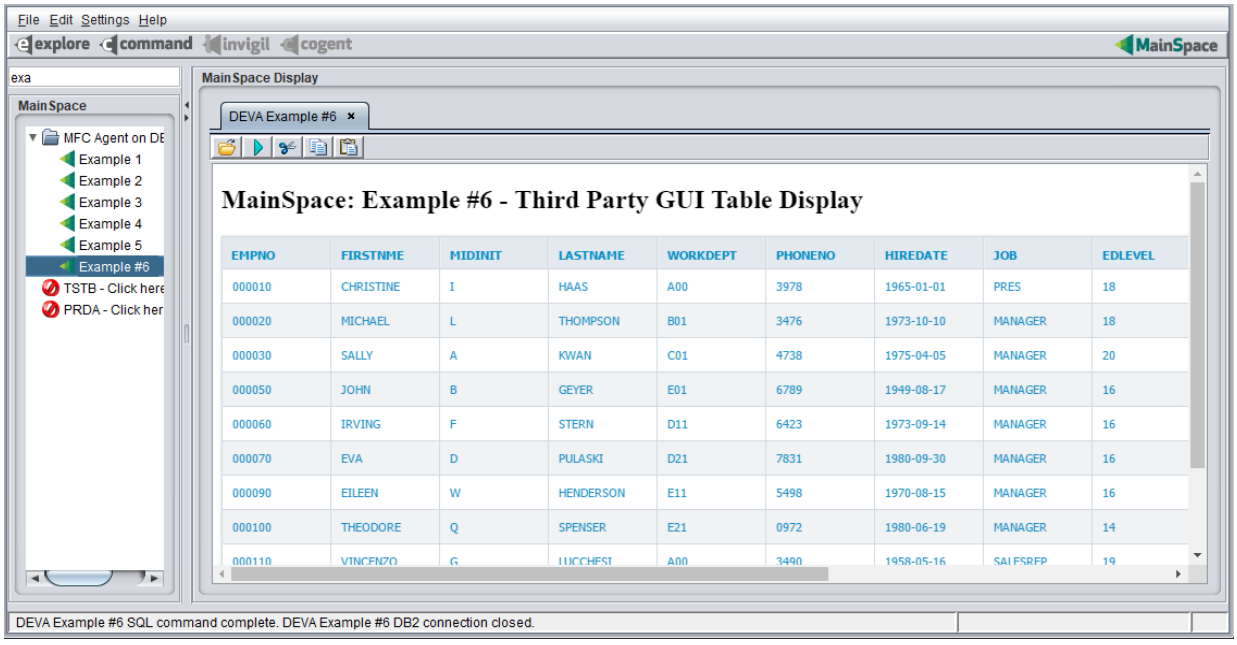
mfcExample6.html – API Call Explained

Referring to the mfcExample6.html sample code let's examine the JSON input to the API Call. A noticeable difference in this example is the format of the input data to the API call. This example formats the input data as a JSON object as opposed to the previous examples which were standard variables.

We create the JSON object (**json_inputargs**) with the required fields (db2ssid, callbackFunction, sql), and we pass this object to the **runSQL** API method call as follows:

```
/*
 * MainSpace API call.
 * Perform an SQL query and call nominated function when SQL query complete.
 */
var obj1 = MFCAgentRequest.newObject();
var json_inputargs = {
    "db2ssid":"DBBG",
    "callbackFunction":"callBack( thisObject.response );",
    "sql":[ "SELECT * FROM DSN81110.EMP"
          ]
};
obj1.runSQL( json_inputargs );
```

Expected Display after the Execute action



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Where to Next?

Write your own Apps using your IDE of choice & explore the art of the possible.

Use the SAMPLE Apps in the Mainframe Cloud platform as inspiration.

Share your App ideas and interact with the MainSpace Github Community here.

MainSpace SAMPLEs

Mainframe Cloud will continue to provide SAMPLE MainSpace Apps to give you an idea of how MainSpace can be used. Only those MainSpace Apps that require some guidance will be listed below.

DB2 View Sample App

This sample MainSpace App – DB2 View – allows you to interrogate DB2 subsystem IDs, schema's and tables that you have authority to view.

The following input fields are available:

DB2 SSID
The up to 4-character z/OS DB2 SSID you wish to interrogate.

Schema Filter
Optional: provide a string to filter the available Schema's for this DB2 SSID.

Table Filter
Optional: provide a string to filter the available Tables for this DB2 SSID and Schema Filter specified.

Maximum Rows
Specify a value otherwise the default will be used.

Maximum Columns
Specify a value otherwise the default will be used.

To run the DB2 View App:

1. Login to Mainframe Cloud.
2. Click **MainSpace** product.
3. Click on the **SAMPLE – DB2 View** app.
4. Double click on the DB2 View TAB to open the iFrame & maximise the window.
   Note: this allows a full window view of the output.
5. Enter the values for each field above.
6. Click the **Load Tables** button.
7. Click on schema's/tables to interrogate the tables.
8. If necessary refresh the app by clicking the **Execute** icon or click on another Table.

Note: Some columns may be omitted if they contain values that are non-displayable. This DB2 View app will list these columns at the bottom of the output.