CUSTOM CONTROLS

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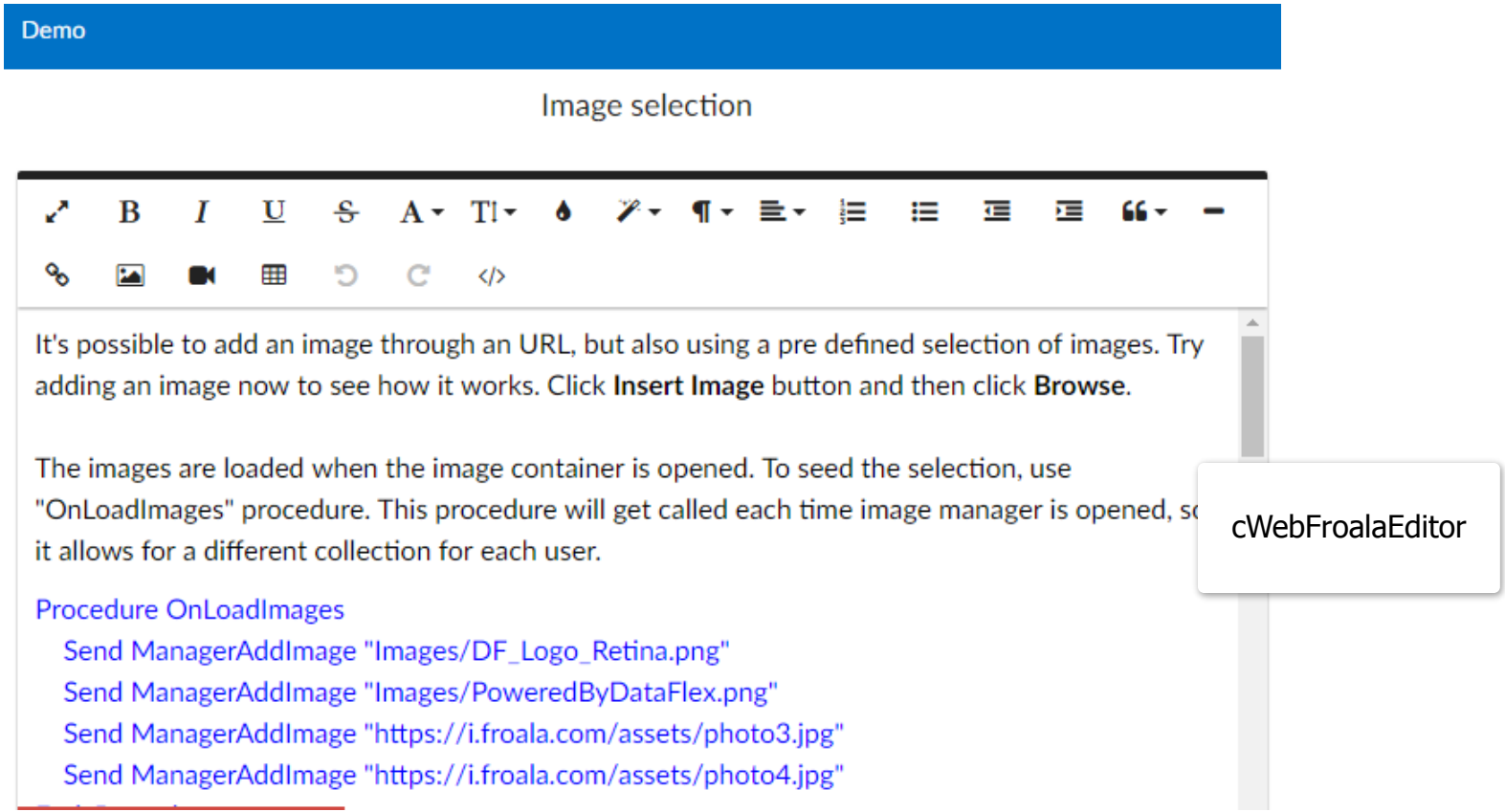
Why a custom control?

- Extra functionalities!

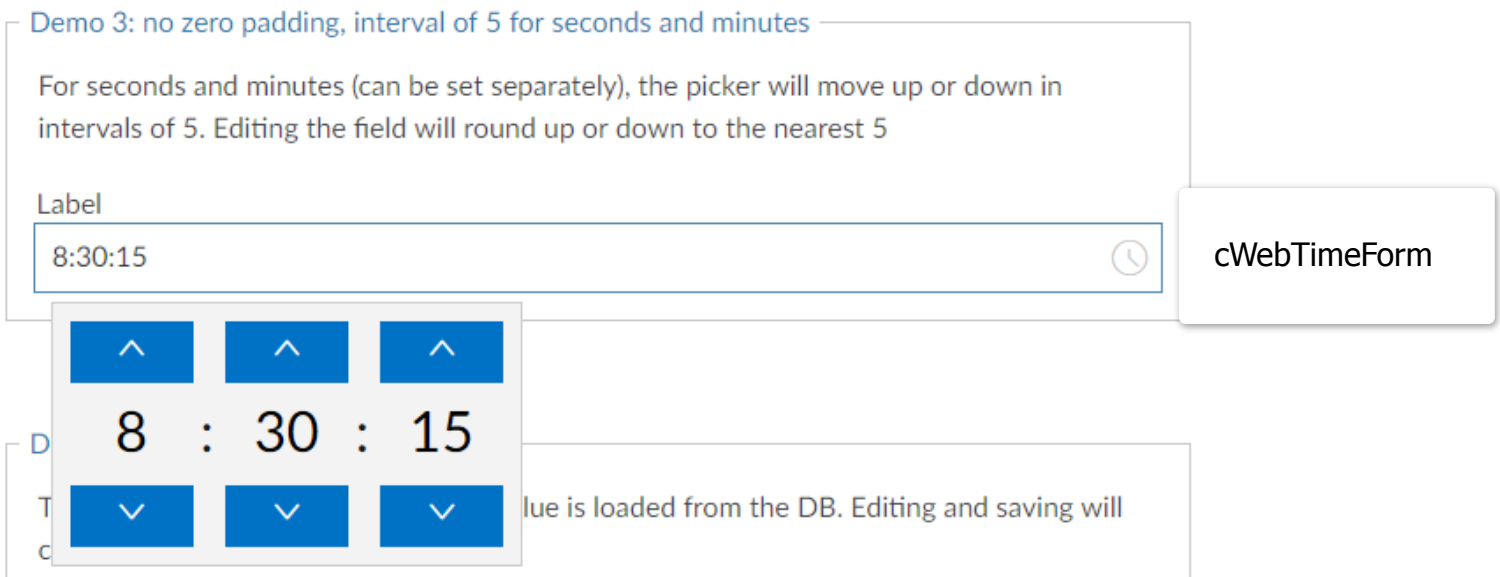
- Generic reusable controls
  - Graphs / Charts
  - Scheduler
  - HTML Editor (Froala)
  - TimePicker

- More feature specific
  - Procedural questionnaire
  - Dynamically generated dashboard

HTML Editor control example



Timepicker example



What is a custom control?

- DataFlex component that you can add to a view.
- Usually something visible

DataFlex

- Server side portion
- A Class
- Provides API's for the application to work with

JavaScript

- Client side portion
- Implements the wanted feature using the framework API's
- Usually renders something on screen
- A pseudo "Class" in javascript

Knowledge required

- DataFlex classes and subclassing
- JavaScript
- HTML and DOM Manipulation
- WebApp Framework basics

To some extent...

- CSS
- Ajax


Case
“Build a scheduler control for the DF Web Framework”

Determining the initial set of requirements

- CRUD: Create, Read, Update and Delete events
- Easy to use, intuitive
- Relatively easy to implement in a variety of applications
- Accept event data in a fixed format, but from multiple sources
- Flexible and customizable

Build or wrap?

Building it ourselves

Pros

- Control over usage, look, etc.
- Possibly more DF "native"

Cons

- Having to build every single piece ourselves

Wrapping an existing library

Pros

- No reinventing the wheel
- Can save a lot of time

Cons

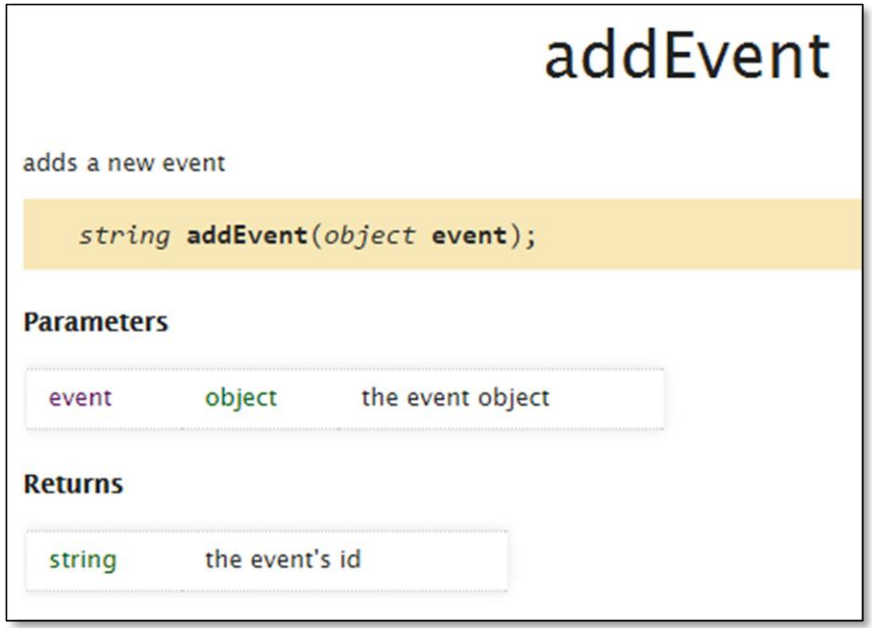
- Limited control over usage, look, etc.
- No API standards
- Possible dependency on other libraries like jQuery

Winner: DHTMLx Scheduler

- Clean, simple but effective look
- User friendly interaction with drag&drop and in-calendar dialogs
- Very flexible
- Very customizable
- Well documented(!)

Cons:

- License for commercial products



addEvent

adds a new event

```
string addEvent(object event);
```

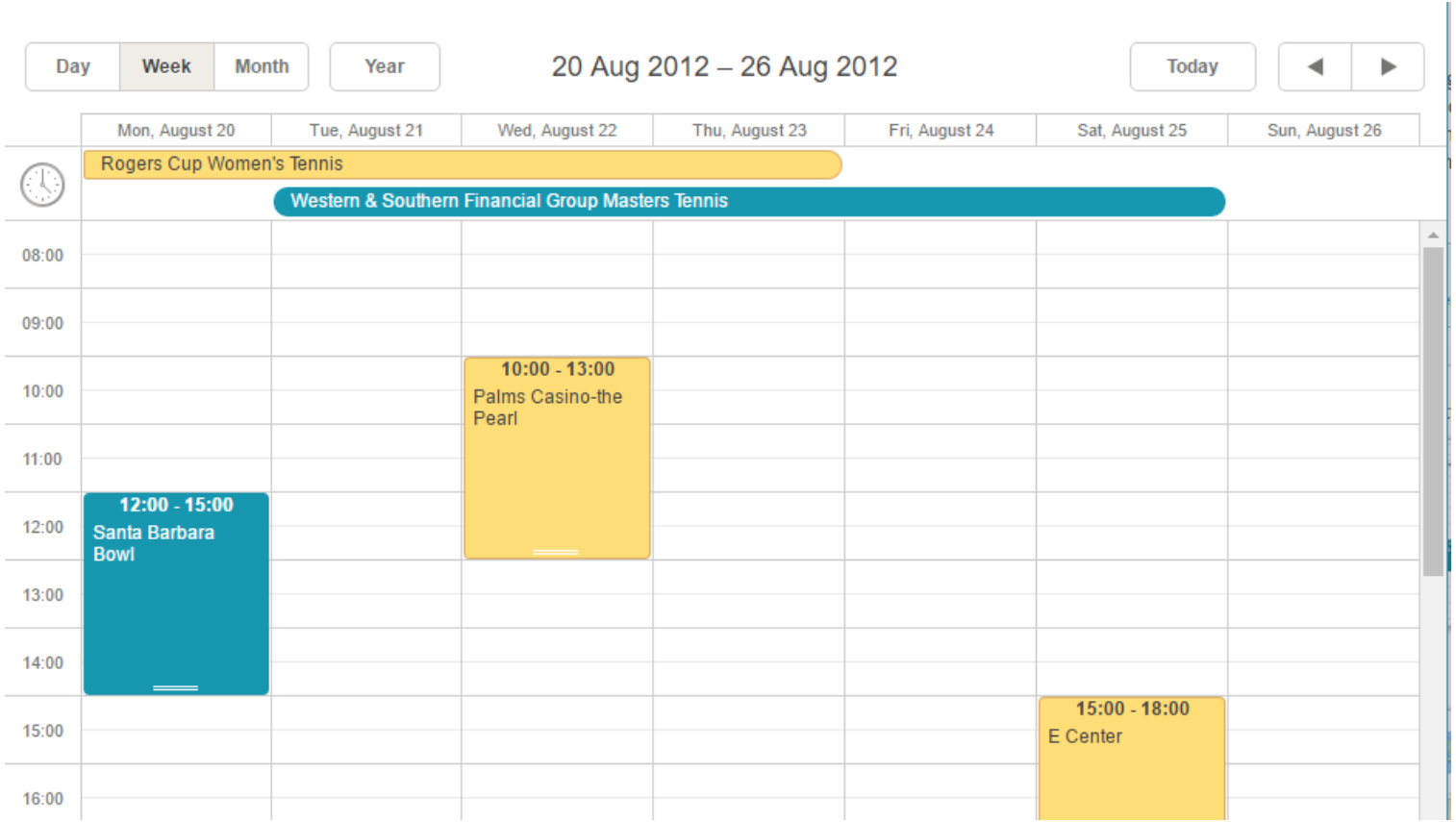
Parameters

event	object	the event object

Returns

string	the event's id

Winner: DHTMLx Scheduler




Setting up…

At the DataFlex side…

- Create a package for our Class
- Extend from a WebApp Framework base class, common ones are
  - cWebObject
  - cWebBaseUIObject
  - cWebBaseControl

cWebSchedulerDemo.pkg*

```
01 Use cWebBaseControl.pkg
02
03 Class cWebDhxScheduler is a cWebBaseControl
04
05 End_Class
```

...

- Define our JS class name
  - This will have to match with the name defined in the JS file later

```
Class cWebDhxScheduler is a cWebBaseControl

    Procedure Construct_Object
        Forward Send Construct_Object

        Set psJSClass to "dfhx.WebDhxScheduler"
    End_Procedure

End_Class
```

...

- Configure super classes

```
Procedure Construct_Object
       Forward Send Construct_Object

       //  Configure super classes
       Set pbFillHeight to True
       Set piColumnSpan to 0
       Set pbShowLabel to False

       Set psJSClass to "dfhx.WebDhxScheduler"
   End_Procedure
```

At the JavaScript side…

- Create a .JS file
- Create a "namespace" object (optional)
- Create our constructor function
  - Configure superclasses

```
//  Create namespace object (dfhx = dataflex dhtmlx)
if(!dfhx){
    var dfhx = {};
}

dfhx.WebDhxScheduler = function WebDhxScheduler(sName, oPrnt){
  //  Configure superclasses
  dfhx.WebDhxScheduler.base.constructor.apply(this, arguments);

};
```

JS

...

- Define our class (matches with class defined in DF)
  - Extend from a base class, common ones:
    - df.WebObject
    - df.WebBaseUIObject
    - df.WebBaseControl

```
//  Create namespace object (dfhx = dataflex dhtmlx)
if(!dfhx){
    var dfhx = {};
}

dfhx.WebDhxScheduler = function WebDhxScheduler(sName, oPrnt){
  // Configure superclasses
  dfhx.WebDhxScheduler.base.constructor.apply(this, arguments);

};

df.defineClass("dfhx.WebDhxScheduler", "df.WebBaseControl", {

    // Control functions and logic will go here

});
```

JS

WebProperties

- Can be used to store things like data, status information and settings for the control
- Property value is shared and maintained between Client and Server
- Engine generates default Get & Set functions in JS if no custom ones are defined
  - Called when executing WebGet and WebSet functions in DF, and at several other times
  - Implement a custom setter method as set_psPropertyName
  - Implement a custom getter method as get_psPropertyName

WebProperties

- Dataflex definition

```
// Defines whether events can be dragged or not
{WebProperty = True}
Property Boolean pbAllowEventDrag
```

- JavaScript definition

```
dfhx.WebDhxScheduler = function WebDhxScheduler(sName, oPrnt){
  dfhx.WebDhxScheduler.base.constructor.apply(this, arguments);

  // Define our property
  this.prop(df.tBool, "pbAllowEventDrag", true);
};
```

- Our custom setter

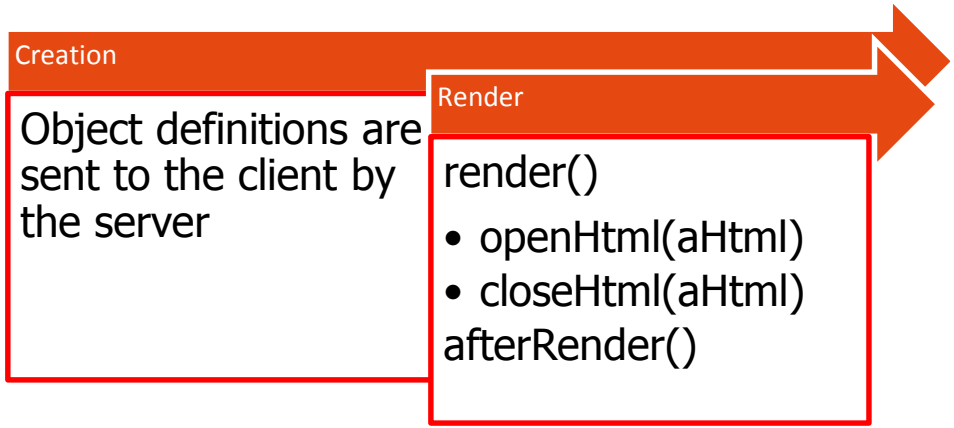
```
set_pbAllowEventDrag : function(bVal){
    if(this._eControl){
        // DhxNoResize true tells the dHTMLx scheduler to not allow event dragging
        // Calling "Set pbAllowEventDrag false" from DF would set DhxNoResize to true, and block event dragging
        df.dom.toggleClass(this._eControl, "DhxNoResize", !bVal);
    }
},
```

Displaying your control on screen

OpenHtml, CloseHtml and AfterRender

Rendering the control

- UI Objects render themselves on the client by generating HTML
- Recursive functions openHtml, closeHtml and afterRender are triggered
  - openHtml and closeHtml are used to insert HTML elements into the document
  - afterRender is called afterwards to perform DOM Manipulation



openHtml, closeHtml

- Our openHtml and closeHtml functions
  - Create a container for our scheduler to fit in using HTML elements
  - On initialization we'll tell the dHTMLx Scheduler to render itself inside this container

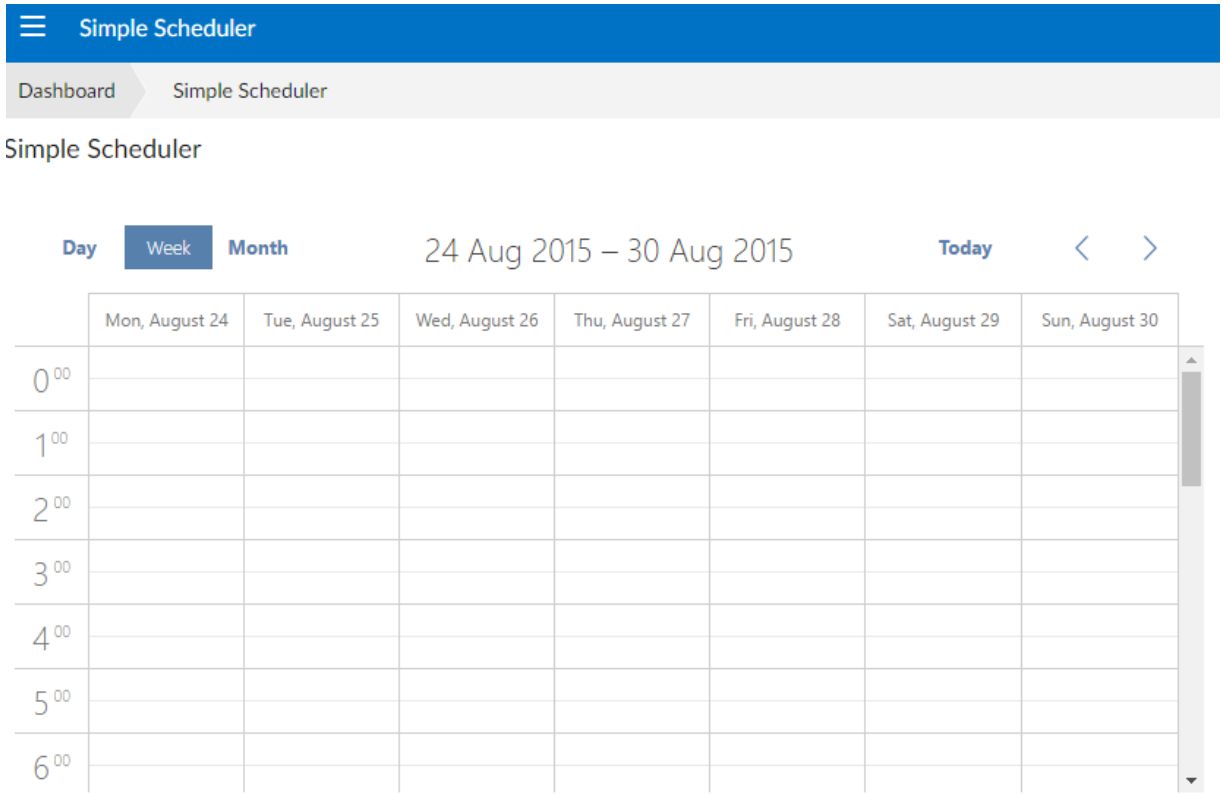
```
// Creates the HTML elements to "draw" for our control
 openHtml : function(aHtml){
   // "Forward send"
   dfhx.WebDhxScheduler.base.openHtml.call(this, aHtml);

   aHtml.push('<div class="dhx_cal_container" style="width:100%; height:100%;">');
   aHtml.push('    <div class="dhx_cal_navline">');
   aHtml.push('        <div class="dhx_cal_date"></div>');
   aHtml.push('    </div>');
   aHtml.push('    <div class="dhx_cal_header"></div>');
   aHtml.push('    <div class="dhx_cal_data"></div>');
   aHtml.push('</div>');
 },

 // Creates the HTML elements to "draw" for our control
 // Called after all openHtml functions are done
 closeHtml : function(aHtml){
   // Just "Forward Send" for now
   dfhx.WebDhxScheduler.base.closeHtml.call(this, aHtml);
 },
```

afterRender

- Our openHtml and closeHtml functions
  - Create a container for our scheduler to fit in using HTML elements
  - On initialization we'll tell the dHTMLx Scheduler to render itself inside this container

```
// Called after the control has been rendered on screen
 afterRender : function(){
   // Find our container, mark it as our control root
   this._eControl = df.dom.query(this._eElem, ".dhx_cal_container");

   // Forward send
   dfhx.WebDhxScheduler.base.afterRender.apply(this, arguments);

   // This function sets dHtmlx Scheduler properties and initializes it in our container
   this.initScheduler();

   // Can only call this setter after control is rendered
   this.set_pbAllowEventDrag(this.pbAllowEventDrag);

 },
```

JS


Simple Scheduler
Dashboard
Simple Scheduler
Simple Scheduler
Day
Week
Month
24 Aug 2015 – 30 Aug 2015
Today
Mon, August 24
Tue, August 25
Wed, August 26
Thu, August 27
Fri, August 28
Sat, August 29
Sun, August 30
0 00
1 00
2 00
3 00
4 00
5 00
6 00


Making it do stuff
ServerActions and ClientActions

ServerActions

- Basically just DF procedures / functions
- Can be called by the JS Client by using:
  - this.serverAction("MethodName", aParams);
- Optionally provide a return value
- Must be made available to the client by using
  - WebPublishProcedure ProcedureName
  - WebPublishFunction FunctionName

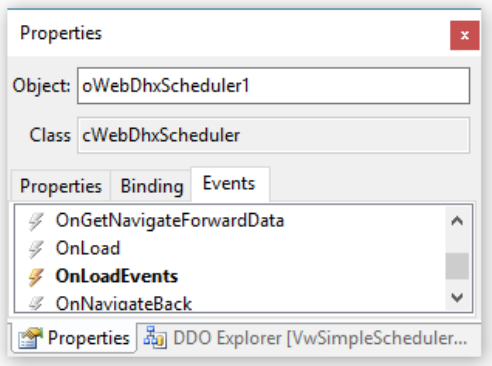
ServerAction to load events

- Our ServerAction, a DataFlex procedure

```
Procedure LoadEvents String sMode String sStartDate String sEndDate
   tWebValueTree tVT
   String[] aParams
   Date dStart dEnd
   //  Event Array to be filled and sent to the client
   tWebDhxEvent[] aEvents

   Move (ConvertFromClient(typeDate, sStartDate)) to dStart
   Move (ConvertFromClient(typeDate, sEndDate)) to dEnd

   //  Event hook, allows augmentation for application specific logic. Fill event array
   Send OnLoadEvents (&aEvents) sMode dStart dEnd

   //  Serialize Event array to a WebValueTree
   ValueTreeSerializeParameter aEvents to tVT

   //  Call clientaction to process data
   Move sMode to aParams[0]
   Move sStartDate to aParams[1]
   Move sEndDate to aParams[2]

   Send ClientAction "handleEvents" aParams tVT
End_Procedure
```

Event “hook”

- Event “hook” for our ServerAction
  - Allows you to define the main universal logic yourself
  - Developers can place application specific logic inside the event
  - Shows up in Object Properties panel!




```
// Called by LoadEvents
{ MethodType=Event }
Procedure OnLoadEvents tWebDhxEvent[] ByRef aEvents String sMode Date dStart Date dEnd
    // Augment this procedure with your own business logic to load events
End_Procedure
```

Exposing and calling our procedure

- Exposing our procedure to the client

```
Procedure End_Construct_Object
        Forward Send End_Construct_Object

        // Allows our "ServerAction" to be called from the JS Client
        WebPublishProcedure LoadEvents

End_Procedure
```

- Calling our procedure from the client

```
loadData : function(sMode, dStart, dEnd){
    // Calls the "LoadEvents" procedure on the server, with given parameters
    this.serverAction("LoadEvents", [ sMode, this.toSvrDate(dStart), this.toSvrDate(dEnd) ], null, function(){
        // Logic to be executed if the function / procedure has returned something
    });
},
```

ClientActions

- Functions in JavaScript
- Can be called by the DF Server by using
  - Send ClientAction "methodName" aParams
  - Send ClientAction "methodName" aParams tWebValueTree
- tWebValueTree is data serialized to a format the client and server can both read and deserialize
- Work asynchronously
- Parameters are provided as Strings

Calling our ClientAction

- Calling our ClientAction “handleEvents” from the server

```
//  Serialize data
      ValueTreeSerializeParameter aEvents to tVT

      //  Call clientaction to process data
      Move sMode to aParams[0]
      Move sStartDate to aParams[1]
      Move sEndDate to aParams[2]

      Send ClientAction "handleEvents" aParams tVT
   End_Procedure
```

Our ClientAction

- Our ClientAction, a function in JavaScript

```
// (De)serializers for data sent by and to the server
 deserializeVT : df.sys.vt.generateDeserializer([ dfhx.tWebDhxEvent ]),
 serializeVT : df.sys.vt.generateSerializer([ dfhx.tWebDhxEvent ]),

 // ClientAction called by the server
 handleEvents : function(sMode, sStart, sEnd){
     // Deserialize received data
     var i, aEvents = this.deserializeVT(this._tActionData);

     if(this._oScheduler){
         this._oScheduler.clearAll();

         //  Convert dates
         for(i = 0; i < aEvents.length; i++){
             aEvents[i].start_date = df.sys.data.stringToDate(aEvents[i].start_date, "yyyy/mm/ddThh:mm:ss.fff");
             aEvents[i].end_date = df.sys.data.stringToDate(aEvents[i].end_date, "yyyy/mm/ddThh:mm:ss.fff");
         }

         //  Pass to scheduler control
         this._oScheduler.parse(aEvents, "json");
     }
 },
```

Using your control in multiple projects

How to import your control

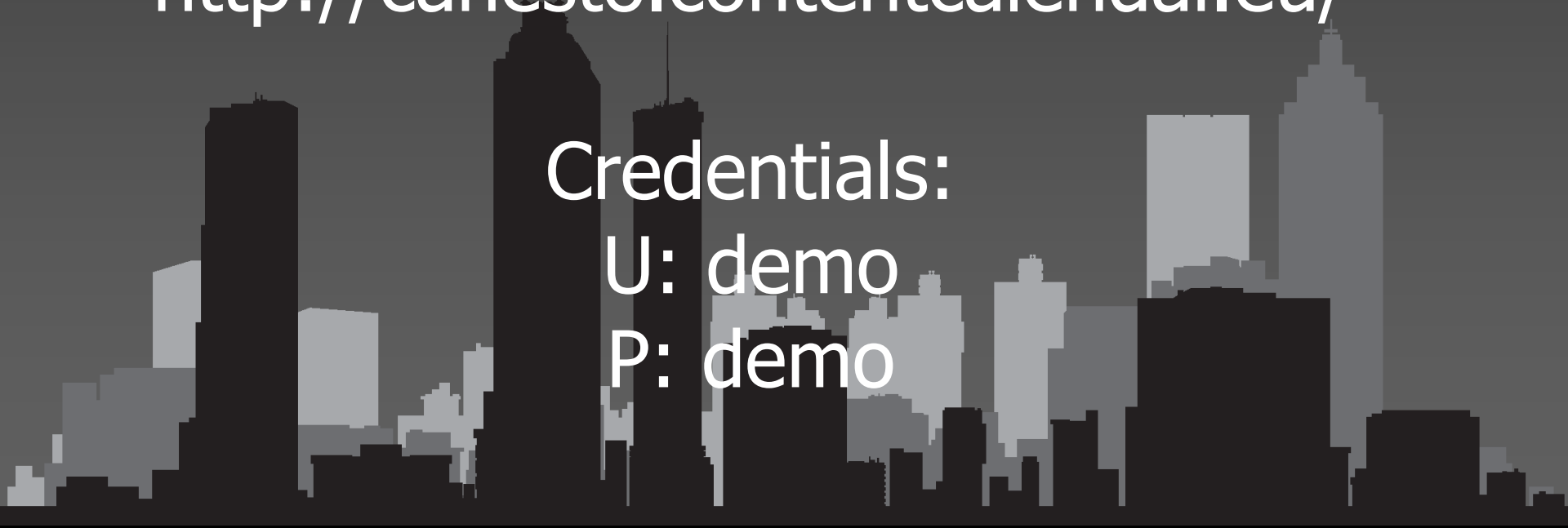
- Develop your control in a separate, standalone workspace
- In your application workspace...
  - add the control workspace as a library
  - copy the control .JS file to an AppHtml subfolder
  - copy any other required files used by the control as well if needed
  - add a reference to the required .JS files in your Index.html
- You can even add it to the class palette for convenience!

```
<!-- DHTMLX Scheduler -->
<script src="dhtmlx/dhtmlxscheduler.js" type="text/javascript"></script>
<script src="dhtmlx/ext/dhtmlxscheduler_limit.js"></script>
<script src="dhtmlx/ext/dhtmlxscheduler_units.js"></script>
<script src="dhtmlx/ext/dhtmlxscheduler_timeline.js"></script>
<script src="dhtmlx/ext/dhtmlxscheduler_multiselect.js"></script>
<script src="dhtmlx/ext/dhtmlxscheduler_tooltip.js"></script>
<!-- <link rel="stylesheet" href="dhtmlx/dhtmlxscheduler.css" type="text/css"> -->
<link rel="stylesheet" href="dhtmlx/dhtmlxscheduler_flat.css" type="text/css">

<!-- DataFlex Custom Controls (do not remove this line, used for automatic insertion) -->
<script src="Custom/WebDhxScheduler.js"></script>
```

Demo:

http://canesto.contentcalendar.eu/

Credentials:
U: demo
P: demo



There's much more to learn!

- Some things we haven't talked about include...
  - Events in-depth
  - Private client properties
  - Synchronized WebProperties
  - Serializing and deserializing data
  - Etc.

- Want some examples? The default WebApp classes are right there!
  - Take a look in the AppHtml/DfEngine of your webapp
  - Study controls like the WebButton, WebForm, etc.


Thank you for your attention
Are there any questions?