

MODERNIZE

EMC WORLD 2016

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The logo for Momentum Las Vegas 16. It features the word "momentum" in a bold, lowercase sans-serif font. Below it, "LAS VEGAS" is written in a smaller, all-caps sans-serif font. To the right of "LAS VEGAS" is a large, stylized number "16" in a thin, outlined font. The background of the slide features a mountain range under a blue sky with clouds, partially obscured by a white curved shape.

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Custom D2 Widgets and Plugins

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Objectives

- Customizations are possible within Documentum D2
- Understand the different types of customizations available in D2
- The Roche approach to customization

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Overview

High level-D2 Customizations

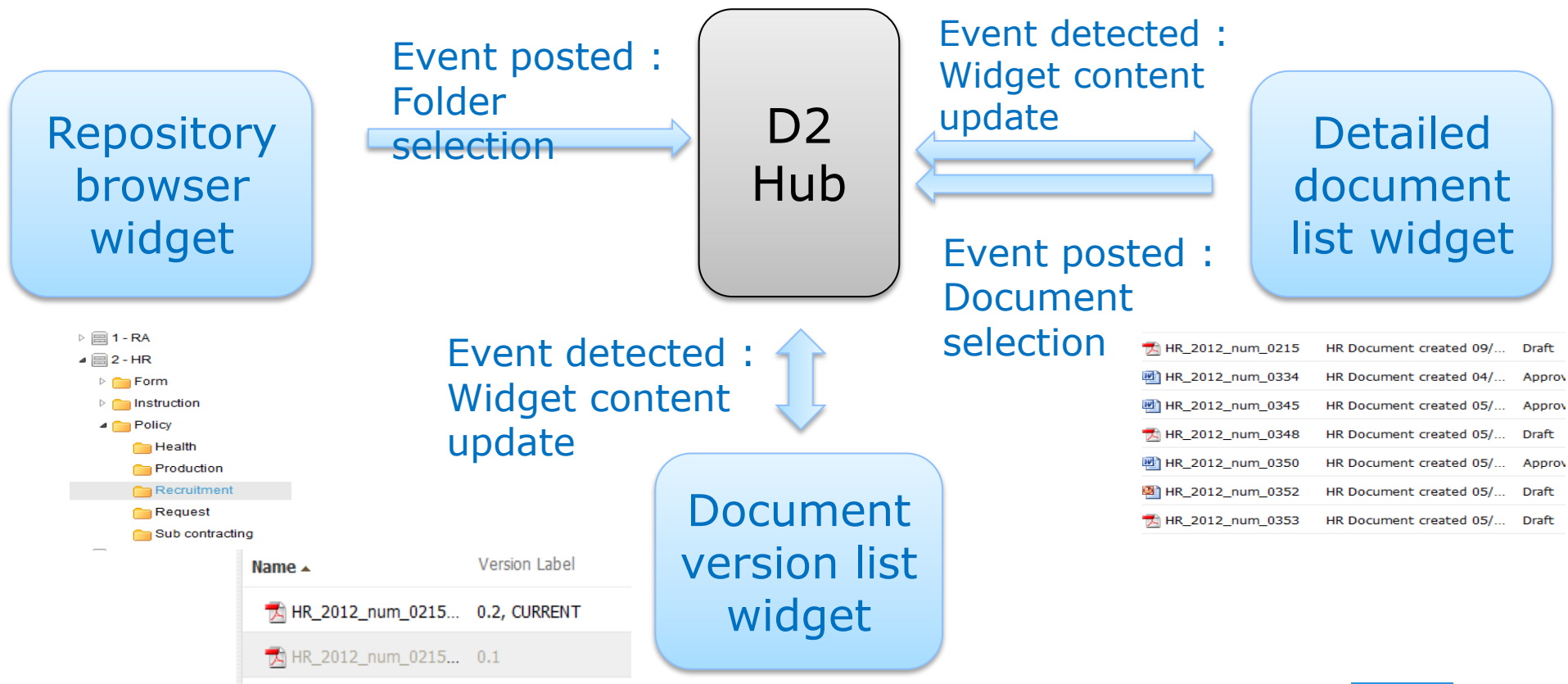
What type of customization should I choose ?

- D2 is a configurable tool. In any case, think configuration first. Most of the time, there is a way to solve your problem just with the configuration or configuration + custom server method .
- I need to apply the D2 configuration from an external application
 - D2FS service call or D2 REST
- I need to do an action before or after a property page is displayed
 - Listener plugin on the dialog service
- I need to export the selected document to a website
 - Action plugin called by a new menu item
- I need to display additional information about the selected document in the user interface :
 - External Widgets

D2 Widgets communication

- D2 is composed of several components: the D2 portal and its widgets.
- They communicate with each other by sending and receiving messages on dedicated communication channels in a hub.
- Each widget can publish and subscribe to events in the hub.
- When an event is published in the hub, widgets that subscribe to this event can be updated or trigger an action.

D2 Widgets communication example



List of Roche D2 customizations

- Widgets
 - Quick Actions
 - Custom Public Searches
 - Audit Trail report
 - Workflow details
 - Task approval
 - Import/Create template selection
- Plugins
 - Freemaker DQL templates in Property Pages and Public Searches
 - Validation of Bulk import/export Excel files
 - Virtual documents management



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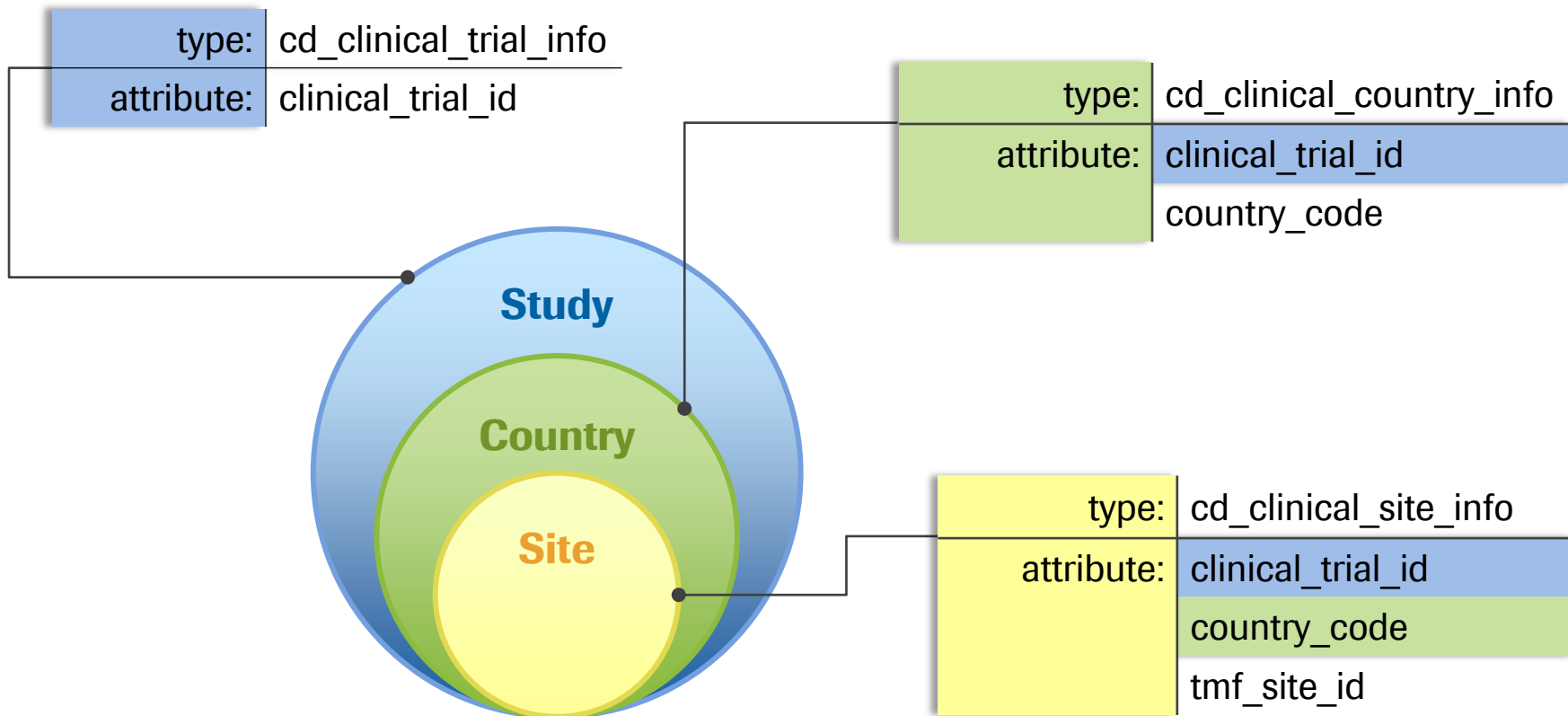
Code4Life

What has been done?

Business case

- Roche eTMF is based on Life Science solution for D2
- eTMF stores documents from clinical trials of Roche medicines
- Trail documents are organized in 4 levels
 - Product
 - Study
 - Country
 - Site

Data model



Wildcard dropdowns

User is able to search for documents by three parameters:

- Study number



A screenshot of a 'Query Form' interface. It features a section titled 'Find Documents' with three input fields: 'Study number: *' (containing 'G02095'), 'Country:', and 'Site:'. Each field has a dropdown arrow icon on its right. Below the fields are two buttons: 'Run' and 'Cancel'. A line from the 'Study number' field points to the SQL code below.

SELECT DISTINCT

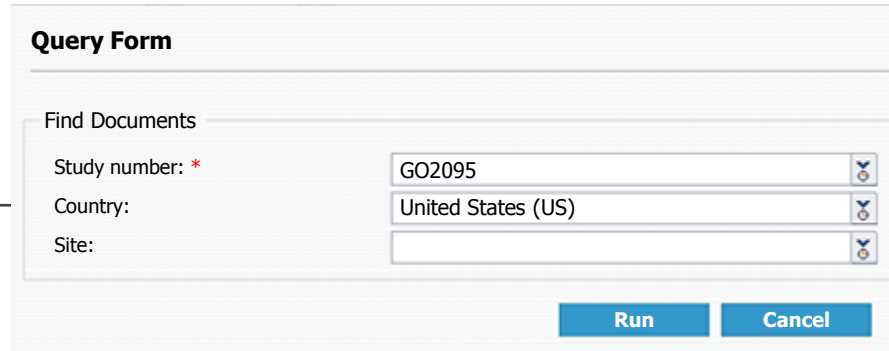
• clinical_trial_id AS name, clinical_trial_id AS label

FROM cd_clinical_trial_info

Wildcard dropdowns

User is able to search for documents by three parameters:

- Country



A screenshot of a 'Query Form' window. It contains a section titled 'Find Documents' with three input fields: 'Study number: *' with the value 'G02095', 'Country:' with the value 'United States (US)', and 'Site:' which is empty. Each field has a dropdown arrow icon on the right. At the bottom of the form are two buttons: 'Run' and 'Cancel'.

`SELECT DISTINCT country_code AS name, object_name AS label`

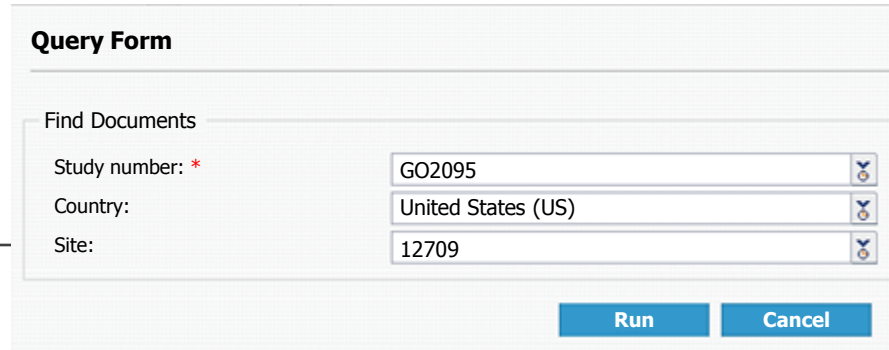
`FROM cd_clinical_country_info`

`WHERE clinical_trial_id = '$value{p_clinical_trial_id}'`

Wildcard dropdowns

User is able to search for documents by three parameters:

- Site number

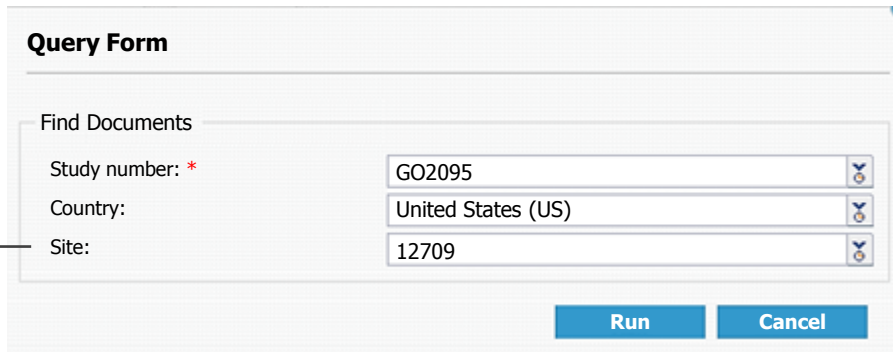


A screenshot of a 'Query Form' interface. It contains three dropdown menus under the heading 'Find Documents'. The first dropdown is labeled 'Study number: *' and has 'G02095' selected. The second is labeled 'Country:' and has 'United States (US)' selected. The third is labeled 'Site:' and has '12709' selected. At the bottom right of the form are two buttons: 'Run' and 'Cancel'. A line from the 'Site:' dropdown points to the SQL query below.

```
SELECT DISTINCT tmf_site_id AS name, site_name AS label
FROM cd_clinical_site_info
WHERE clinical_trial_id = '$value{p_clinical_trial_id}'
      and country_code = '$value{p_country_code}'
```


Wildcard dropdowns

- It is possible that user may skip the country parameter
- This way user can select from a list of all sites from any country



A screenshot of a 'Query Form' interface. It contains three input fields: 'Study number: *' with the value 'GO2095', 'Country:' with the value 'United States (US)', and 'Site:' with the value '12709'. Each field has a dropdown arrow icon on the right. Below the fields are 'Run' and 'Cancel' buttons. A line from the 'WHERE' clause in the SQL below points to the 'Site' field.

```
SELECT DISTINCT tmf_site_id AS name, site_name AS label
FROM cd_clinical_site_info
WHERE clinical_trial_id = '$value{p_clinical_trial_id}'
and country_code = '$value{p_country_code}'
```

Dynamic controls

Why in some cases query form is not enough

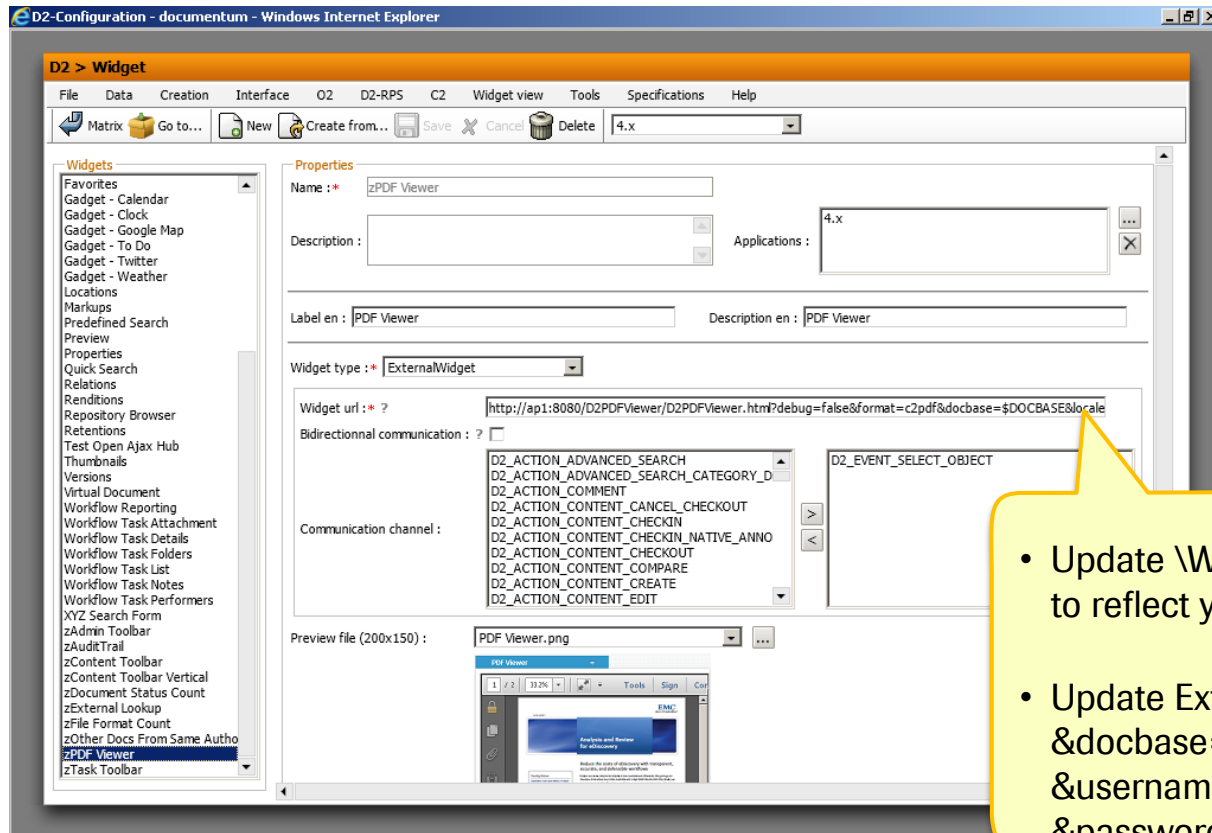
- Property Pages in D2 and DQL have no support for conditional statements
- D2 allows you to write plugins with:
 - *IDynamicControl* – manages how a property page control is generated
 - *IJavaAssistance* – called to provide a list of possible values of a control
- Freemarker is a free library allowing to write complex templates which output plain text
 - parameters
 - conditional statements
 - enumerations

Freemarker features

- Parameters, conditional statements

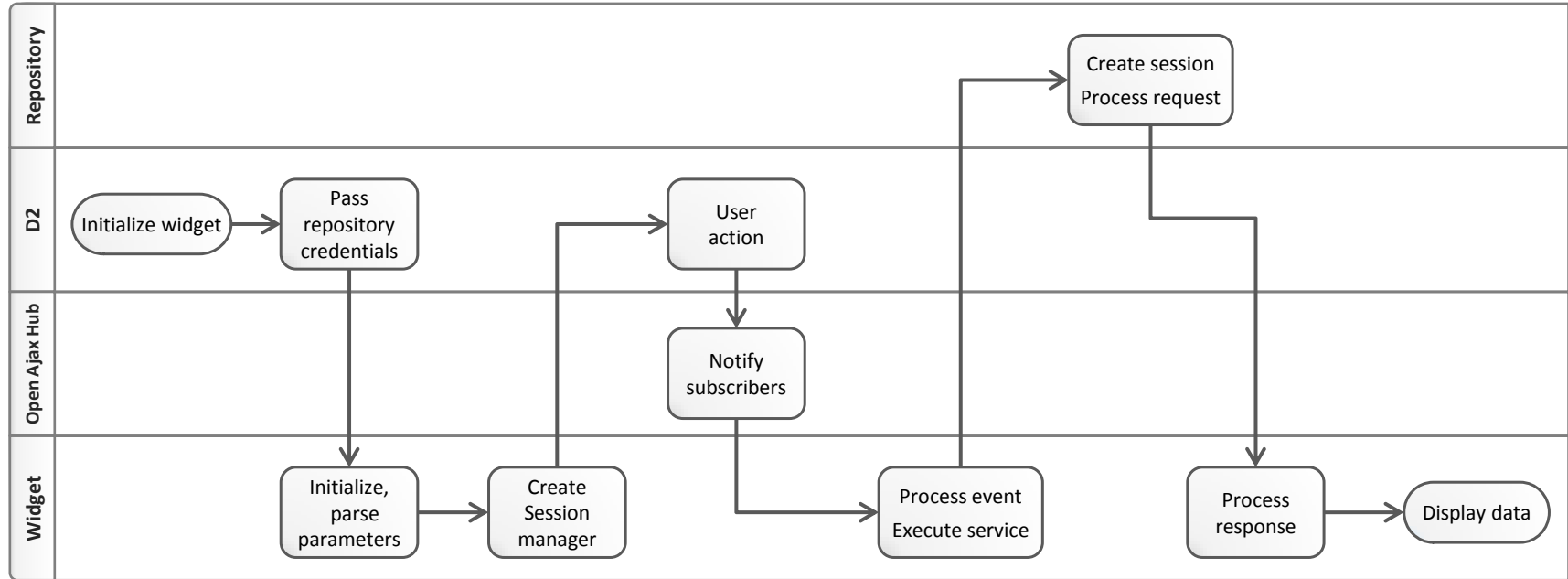
```
SELECT DISTINCT tmf_site_id as name, site_name as label  
  
FROM          cd_clinical_site_info  
  
WHERE         clinical_trial_id = '${p_clinical_trial_id}'  
              <#if p_country_code?has_content>  
                and country_code = '${p_country_code}',  
              </#if>
```

Non-MVC widgets



- Update `\\WEB-INF\\classes\\dfc.properties` to reflect your repository
- Update ExternalWidget url:
`&docbase=$DOCBASE`
`&username=$LOGIN`
`&password=$TICKET`

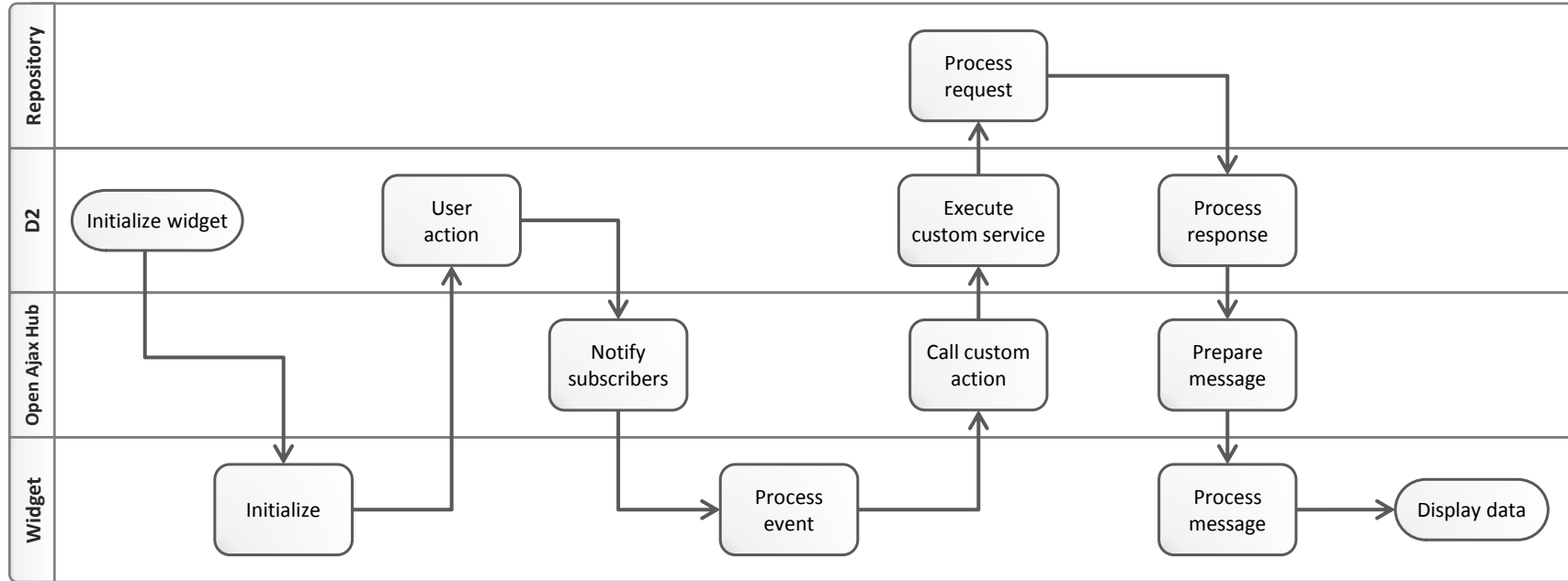
Non-MVC approach



Drawbacks:

1. Widget is dfc.properties dependent
2. DFC jars inside widget
3. You cannot share your services across multiple widgets

MVC approach



Advantages:

1. Widget is DFC independent - plugin session provided and managed by D2
2. Reusable services
3. Widget may be developed with pure JavaScript or any JavaScript framework

D2 plugins as services

```
public class QueryDqlObjectService implements IPluginAction {  
    public List<Attribute> getUserList(D2fsContext context) throws Exception {  
        List<Attribute> result = new ArrayList<Attribute>();  
        Attribute oamValue = new Attribute();  
        oamValue.setName("oam_value");  
        ParameterParser params = context.getParameterParser();  
        String group_name = params.getStringParameter("group_name");  
        IDfCollection collection = null;  
        List<String> userList = new ArrayList<String>();  
        try {  
            DfQuery query = new DfQuery("select users_names from dm_group " +  
                                         "where group_name='" + group_name + "'");  
            collection = query.execute(context.getSession(), IDfQuery.READ_QUERY);  
            while (collection.next())  
                userList.add(collection.getString("users_names"));  
        } finally {  
            if (collection != null) collection.close();  
        }  
        oamValue.setValue(new Gson().toJson(userList));  
        result.add(oamValue);  
        return result;  
    }  
}
```

Prepare
result list

Read
parameters

Prepare
DQL

Execute
DQL

Return
result

D2FS inside plugins

```
public class BrowserContentService implements IPluginAction {
    public List<Attribute> getBrowserContent(D2fsContext context) throws Exception {
        List<Attribute> result = new ArrayList<Attribute>();
        Attribute oamValue = new Attribute();
        oamValue.setName("oam_value");
        ParameterParser params = context.getParameterParser();
        String parentId = params.getStringParameter("parent_id", null);
        String nodeType = params.getStringParameter("node_type", null);
        GetBrowserContentRequest request = new GetBrowserContentRequest();
        request.setContext(context);
        request.setContentTypeName(nodeType);
        request.setId(parentId);
        ModelPort port = getModelPort(context);
        GetBrowserContentResponse response = port.getBrowserContent(request);
        List<Node> nodeChildren = new ArrayList<Node>();
        if (serviceResult != null)
            nodeChildren.addAll(serviceResult.getNodes());
        oamValue.setValue(new Gson().toJson(nodeChildren));
        result.add(oamValue);
        return result;
    }
}
```

Prepare
result list

Read
parameters

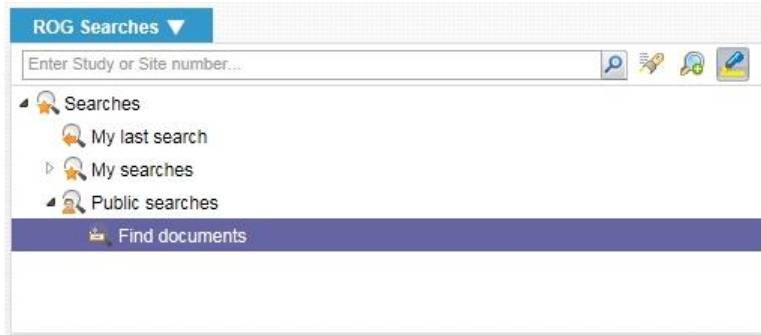
Prepare
D2FS
request

Process
response


Return
result

Consistent look-and-feel across D2 interface

1. D2 was developed using Sencha ext-GWT:
Framework with feature-rich, high-performance UI components interoperable with GWT
2. Custom widget can be easily merged with standard D2 theme
3. You build with the same “blocks” from which D2 has been made of



Consistent look-and-feel across D2 interface

My workflows ▼ 					
Workflow name	Document name	Task name	Performer name	Start date	Due date
AcquireApproval	asdfasdf asdfasdf asdf ListSDP for Avastin.		idmt05, Basel (idmt05)	10-Mar-2016 17:22:53	24-Mar-2016
AcquireApproval	asdfasdf asdfasdf asdf ListSDP for Avastin.		idmt05, Basel (idmt05)	10-Mar-2016 16:38:02	24-Mar-2016
AcquireApproval	Appendix 2a Title Page		idmt05, Basel (idmt05)	10-Mar-2016 16:17:35	25-Mar-2016
AcquireApproval	asdfasdf asdfasdf asdf ListSDP for Avastin.		idmt05, Basel (idmt05)	10-Mar-2016 16:13:36	31-Mar-2016
AcquireApproval	Appendix 2a Title Page		idmt05, Basel (idmt05)	10-Mar-2016 16:12:16	25-Mar-2016
Acquire E-Signature 09-Mar-2016	sulfamethoxazole + trimethoprim 5:1 ACO...		idmt05, Basel (idmt05)	09-Mar-2016 16:28:35	18-Mar-2016
Acquire E-Signature 09-Mar-2016	sulfamethoxazole + trimethoprim 5:1 ACO...		idmt05, Basel (idmt05)	09-Mar-2016 16:06:51	18-Mar-2016
Acquire Approval 09-Mar-2016	Test business meaning MN ListSDP for Bact...		idmt05, Basel (idmt05)	09-Mar-2016 15:26:49	18-Mar-2016
Acquire Approval 08-Mar-2016	Appendix 1 Title Page		idmt05, Basel (idmt05)	08-Mar-2016 16:03:33	23-Mar-2016
📁 Acquire Approval 01-Mar-2016	Test business meaning Guided Questionnai...		idmt05, Basel (idmt05)	01-Mar-2016 13:48:25	11-Mar-2016
		In Approval	idmt05, Basel (idmt05)	01-Mar-2016 13:48:34	11-Mar-2016
Acquire Approval 01-Mar-2016	Test business meaning Guided Questionnai...		idmt05, Basel (idmt05)	01-Mar-2016 12:41:21	11-Mar-2016
📁 Acquire Approval 29-Feb-2016	test dictionary ListSDP for Bactrim.		idmt05, Basel (idmt05)	29-Feb-2016 17:30:02	26-Feb-2016
		In Approval	idmt05, Basel (idmt05)	29-Feb-2016 17:30:06	26-Feb-2016
📁 AcquireApproval	Title Page		idmt05, Basel (idmt05)	24-Feb-2016 13:16:18	27-Feb-2016
		In Approval	idmt03, Basel (idmt03)	24-Feb-2016 13:16:22	27-Feb-2016
📁 AcquireApproval	Title Page		idmt05, Basel (idmt05)	24-Feb-2016 11:39:49	29-Feb-2016
		In Approval	idmt02, Basel (idmt02)	24-Feb-2016 11:39:53	29-Feb-2016
AcquireApproval	MRP Specimen 40		idmt05, Basel (idmt05)	22-Feb-2016 22:42:30	27-Feb-2016
Acquire E-Signature 17-Feb-2016	PBRER for Bactrim., 2/18/2016 12:00:00 A...		idmt05, Basel (idmt05)	17-Feb-2016 14:21:26	18-Feb-2016

Consistent look-and-feel across D2 interface

Select/Search a Template ▼			
Name	Version	Modification date	Template Content ID
▶ Recently used			
▶ Pharmacovigilance			
▶ Periodic Safety Reports			
▶ Developmental Safety Update Report (DSUR)			
▶ DSUR			
DSUR	1.0	Fri Mar 04 15:12:16 GMT+100 20...	IDM3.3.1.1-PR-PD-EMA
▶ Integrated Working Document (IWD)			
▶ IWD			
IWD - PADER	1.0	Fri Mar 04 15:10:20 GMT+100 20...	IDM3.3.5.1-PR-PD-Global
IWD - ACO	1.0	Fri Mar 04 15:10:20 GMT+100 20...	IDM3.3.5.1-PR-PD-Global-
IWD - SSR	1.0	Fri Mar 04 15:10:20 GMT+100 20...	IDM3.3.5.1-PR-PD-Global-
IWD - DSUR	1.0	Fri Mar 04 15:10:20 GMT+100 20...	IDM3.3.5.1-PR-PD-Global-
IWD - PBRER	1.0	Fri Mar 04 15:10:20 GMT+100 20...	IDM3.3.5.1-PR-PD-Global-
IWD - EU RMP	1.0	Fri Mar 04 15:10:21 GMT+100 20...	IDM3.3.5.1-PR-PD-Global-
IWD - cRMP	1.0	Fri Mar 04 15:10:21 GMT+100 20...	IDM3.3.5.1-PR-PD-Global-
▶ Periodic Adverse Drug Experience Report (PADER)			
▶ Periodic Benefit-Risk Evaluation Report (PBRER)			
▶ Six Monthly SUSAR Report (SSR)			
▶ Pharmacovigilance System			

Roche JSNI wrapper for OAH

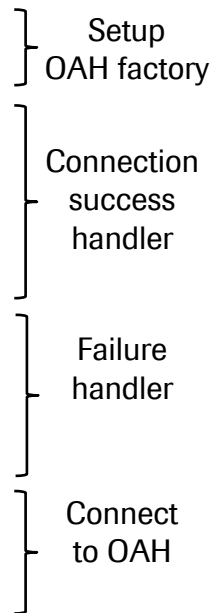
Connecting widget with OAH

```
public class SampleWidget implements EntryPoint {
    private OpenAjaxHub openAjaxHub;

    public void onModuleLoad() {
        OpenAjaxHubFactory openAjaxHubFactory = new OpenAjaxHubFactory(true,
            "D2_EVENT_CUSTOM", "D2_EVENT_SELECT_OBJECT");

        openAjaxHubFactory.setConnectCompletedCallback(new AsyncCallback() {
            public void onSuccess(HubConnectionMessage result) {
                openAjaxHub = result.getHubClient();
                RootPanel.get().add(new WidgetContainer(openAjaxHub));
            }
            public void onFailure(Throwable caught) {
                Info.display("Sample widget", "Failed to connect to OAH");
            }
        });

        openAjaxHubFactory.connect();
    }
}
```



D2 event callbacks

```
AsyncCallback<OpenAjaxMessage> callback = new AsyncCallback<OpenAjaxMessage>() {  
    public void onSuccess(OpenAjaxMessage result) {  
        String id = result.getId();  
        String name = result.getParameter("object_name");  
  
        Info.display("Selected object", name + ":" + id);  
    }  
    public void onFailure(Throwable caught) {  
  
    }  
};  
openAjaxHub.subscribe("D2_EVENT_SELECT_OBJECT", callback);
```

} Event
receive
handler

} Register
callback

Callbacks for custom services

```
OpenAjaxMessage message = OpenAjaxMessageFactory.create();
message.setParameter("group_name", "dep_it");

openAjaxHub.callService("CustomUserService", "getUserList", message,
    new ServiceCallback<OpenAjaxMessage>() {

    public void onSuccess(OpenAjaxMessage result) {
        JsonReader jsonReader = new JsonReader(type);
        MemoryProxy proxy = new MemoryProxy(result.getValue());

        BaselistLoader listLoader = new BaselistLoader(proxy, jsonReader);
        ListStore<ModelData> store = new ListStore<ModelData>(listLoader);
        dropdownControl.setStore(store);
        listLoader.load();
    }

    public void onFailure(Throwable caught) {
        Info.display("Sample widget", "Failed to call service");
    }
});
```

} Create OAH message

} Called service

} Service results processing

} Failure handler

Additional resources

- Tutorials - EMC Community Blog

<http://community.emc.com/people/KJurkowski/blog/2015/03/17/gxt-d2-widgets-tutorials>

- GXT D2 Widgets
- Freemarker dynamic controls
- Public searches - GXT D2 Widgets

- Source code published on Roche GitHub

<https://github.com/Roche/ROGeTMF>

Doing now what patients need next

HACK -A- THON

Thursday May 5th // 8:30am – 12:30pm

Please bring your laptops!

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Sessions Available

- xCP
- D2
- Captiva
- Docker
- Documentum APIs
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