How to develop a Slack Notification plugin

In this tutorial, we will follow the guideline for developing a plugin to develop our Slack Notification plugin. Please also refer to the very first tutorial How to develop a Bean Shell Hash Variable for more details steps.

1. What is the problem?

We want to send message to Slack to notify user when there is an assignment created for them in Joget Workflow.

2. How to solve the problem?

We will develop an Audit Trail Plugin to send message to Slack.

3. What is the input needed for your plugin?

To develop a Slack Notification plugin, we will consider providing the properties options similar to User Notification plugin.

4. What is the output and expected outcome of your plugin?

When an assignment is created for an user, a message with assignment link will send to his/her Slack account based on the configuration.

5. Are there any resources/API that can be reused?

We can use slack-webhook library to integrate with Slack. We can also extend the org.joget.apps.app.lib.UserNotificationAuditTrail to save our time on re-implement similar methods.

6. Prepare your development environment

We need to always have our Joget Workflow Source Code ready and builded by following this guideline.

The following tutorial is prepared with a Macbook Pro and the Joget Source Code is version 5.0.1. Please refer to the Guideline for developing a plugin article for other platform commands.

Let's say our folder directory is as follows.

```
- Home
  - joget
    - plugins
    - jw-community
      -5.0.1
```

The "plugins" directory is the folder we will create and store all our plugins and the "jw-community" directory is where the Joget Workflow Source code is stored.

Run the following command to create a maven project in "plugins" directory.

```
cd joget/plugins/
~/joget/jw-community/5.0.1/wflow-plugin-archetype/create-plugin.sh org.joget
slack_notification 5.0.1
```

Then, the shell script will ask us to key in a version number for the plugin and ask us for a confirmation before it generates the maven project.

```
Define value for property 'version':  1.0-SNAPSHOT: : 5.0.0
[INFO] Using property: package = org.joget
Confirm properties configuration:
groupId: org.joget
artifactId: slack_notification
version: 5.0.0
package: org.joget
Y: : y
```

We should get a "BUILD SUCCESS" message shown in our terminal and a "slack_notification" folder created in the "plugins" folder.

Open the maven project with your favourite IDE. I will be using NetBeans.

7. Just code it!

a. Extending the abstract class of a plugin type

Create a "SlackNotification" class under "org.joget" package. Then, extend the class with **org.joget.apps.app.lib.UserNotificationAuditTrail** cla ss which is extends **org.joget.plugin.base.DefaultAuditTrailPlugin** abstract class. Please refer to Audit Trail Plugin. We will need to implement **org.joget.plugin.base.PluginWebSupport** interface class as well to provide a send test message button in plugin properties page. Please refer to Web Service Plugin.

b. Implement all the abstract methods

As usual, we have to implement all the abstract methods. We will using AppPluginUtil.getMessage method to support i18n and using constant variable MESSAGE_PATH for message resource bundle directory.

Implementation of all basic abstract methods

Expand source

```
package org.joget;

import org.joget.apps.app.lib.UserNotificationAuditTrail;
import org.joget.apps.app.service.AppPluginUtil;
import org.joget.apps.app.service.AppUtil;

public class SlackNotification extends UserNotificationAuditTrail {
    private final static String MESSAGE_PATH = "message/SlackNotification";

    @Override
    public String getName() {
        return "Slack Notification";
    }
    @Override
    public String getVersion() {
        return "5.0.0";
    }

    @Override
    public String getClassName() {
        return getClass().getName();
    }

    @Override
    public String getLabel() {
        //support i18n
        return AppPluginUtil.getMessage("org.joget.SlackNotification.pluginLabel",
getClassName(), MESSAGE_PATH);
    }
    @Override
    public String getDescription() {
        //support i18n
        return AppPluginUtil.getMessage("org.joget.SlackNotification.pluginDesc",
getClassName(), MESSAGE_PATH);
    }

    @Override
    public String getPropertyOptions() {
        return AppUtil.readPluginResource(getClass().getName(),
"/properties/slackNotification.json", null, true, MESSAGE_PATH);
    }
}
```

Now, we have to create a UI for admin user to provide inputs for our plugin. In getPropertyOptions method, we already specify our Plugin Properties Options definition file is located at "/properties/slackNotification.json". Let us create a directory "resources/properties" under "slack_notification/src/main" directory. After creating the directory, create a file named "slackNotification.json" in the "properties" folder.

In the properties definition options file, we will need to provide options as below. Please note that we can use "@@message.key@@" syntax to support i18n in our properties options. Here, we can actually copy the properties options of User Notification plugin and modify from there. Please refer to userNotificationAuditTrail.json.

```
[{
    title : '@@SlackNotification.config@@',
    properties : [
```

```
{
    name : 'apiurl',
    label : '@@SlackNotification.url@@',
    type : 'textfield',
    required : 'true'
},
{
    label : '@@SlackNotification.from@@',
    type : 'header'
},
{
    name : 'username',
    label : '@@SlackNotification.fromUsername@@',
    type : 'textfield',
    value : '@@SlackNotification.fromUsername.value@@'
},
{
    name : 'customIcon',
    label : '@@SlackNotification.customIcon@@',
    type : 'selectbox',
    value : 'joget',
    options : [{
        value : '',
        label : '@@SlackNotification.customIcon.none@@'
    },
    {
        value : 'joget',
        label : '@@SlackNotification.customIcon.joget@@'
    },
    {
        value : 'url',
        label : '@@SlackNotification.customIcon.url@@'
    },
    {
        value : 'emoji',
        label : '@@SlackNotification.customIcon.emoji@@'
    }]
},
{
    name : 'iconUrl',
    label : '@@SlackNotification.customIcon.url@@',
    type : 'textfield',
    required : 'true',
    control_field: 'customIcon',
    control_value: 'url',
    control_use_regex: 'false'
},
{
    name : 'iconEmoji',
    label : '@@SlackNotification.customIcon.emoji@@',
    type : 'textfield',
    required : 'true',
    control_field: 'customIcon',
    control_value: 'emoji',
    control_use_regex: 'false'
},
{
    label : '@@SlackNotification.to@@',
    type : 'header'
```

```
    },
    {
        name : 'usernameTransform',
        label : '@@SlackNotification.usernameTransform@@',
        description : '@@SlackNotification.usernameTransform.desc@@',
        type : 'textfield',
        value : '@@SlackNotification.usernameTransform.value@@',
        required : 'True'
    },
    {
        label : '@@SlackNotification.message@@',
        type : 'header'
    },
    {
        name : 'text',
        label : '@@SlackNotification.text@@',
        description : '@@SlackNotification.text.desc@@',
        type : 'codeeditor',
        required : 'True'
    },
    {
        name : 'unfurl_links',
        label : '@@SlackNotification.unfurl_links@@',
        description : '@@SlackNotification.unfurl_links.desc@@',
        type : 'checkbox',
        value : 'true',
        options : [{
            value : 'true',
            label : ''
        }]
    },
    {
        name : 'unfurl_media',
        label : '@@SlackNotification.unfurl_media@@',
        description : '@@SlackNotification.unfurl_media.desc@@',
        type : 'checkbox',
        value : 'true',
        options : [{
            value : 'true',
            label : ''
        }]
    }],
    buttons : [{
        name : 'sendTestMessage',
        label : '@@SlackNotification.sendTestMessage@@',
        ajax_url :
'[CONTEXT_PATH]/web/json/app[APP_PATH]/plugin/org.joget.SlackNotification/service?acti
on=sendTestMessage',
        fields : ['url'],
        addition_fields : [
            {
                name : 'testChannel',
                label : '@@SlackNotification.sendTestMessage.testChannel@@',
                type : 'textfield'
            }
        ]
    }]
},
{
```

```
    title : '@@app.usernotificationaudittrail.notificationLink@@',
    properties : [
    {
        name : 'base',
        label : '@@app.usernotificationaudittrail.baseUrl@@',
        type : 'textfield',
        description : '@@app.usernotificationaudittrail.baseUrl.desc@@',
        required : 'True'
    },
    {
        name : 'url',
        label : '@@app.usernotificationaudittrail.url@@',
        type : 'textfield'
    },
    {
        name : 'urlName',
        label : '@@app.usernotificationaudittrail.urlName@@',
        type : 'textfield'
    },
    {
        name : 'parameterName',
        label : '@@app.usernotificationaudittrail.parameterName@@',
        description : '@@app.usernotificationaudittrail.parameterName.desc@@',
        type : 'textfield',
        value : 'activityId'
    },
    {
        name : 'passoverMethod',
        label : '@@app.usernotificationaudittrail.passoverMethod@@',
        type : 'selectbox',
        value : 'param',
        options : [{
            value : 'none',
            label : '@@app.usernotificationaudittrail.passoverMethod.none@@'
        },
        {
            value : 'append',
            label : '@@app.usernotificationaudittrail.passoverMethod.append@@'
        },
        {
            value : 'param',
            label : '@@app.usernotificationaudittrail.passoverMethod.param@@'
        }]
    }]
},
{
    title : '@@app.usernotificationaudittrail.advanced@@',
    properties : [{
        name : 'exclusion',
        label : '@@app.usernotificationaudittrail.activityExclusion@@',
        type : 'multiselect',
        size : '10',
        options_ajax :
'[CONTEXT_PATH]/web/json/app[APP_PATH]/plugin/org.joget.apps.app.lib.UserNotificationA
```

```
uditTrail/service?action=getActivities'
    }]
}]
```

After completing the properties option to collect inputs, we can work on the main methods of the plugin which is execute method. But, since we extended UserNotificationAuditTrail class, we just need to override the sendEmail method which used to send out email by UserNotificationAuditTrail class.

```
private SlackApi api = null;

    @Override
    protected void sendEmail (final Map props, final AuditTrail auditTrail, final
WorkflowManager workflowManager, final List<String> users, final WorkflowActivity
wfActivity) {
        new PluginThread(new Runnable() {
            public void run() {
                WorkflowUserManager workflowUserManager = (WorkflowUserManager)
AppUtil.getApplicationContext().getBean("workflowUserManager");
                String base = (String) props.get("base");
                String url = (String) props.get("url");
                String urlName = (String) props.get("urlName");
                String parameterName = (String) props.get("parameterName");
                String passoverMethod = (String) props.get("passoverMethod");
                String text = (String) props.get("text");
                String linkLabel =
AppPluginUtil.getMessage("SlackNotification.viewAssignment", getClassName(),
MESSAGE_PATH);
                String activityInstanceId = wfActivity.getId();
                String link = getLink(base, url, passoverMethod, parameterName,
activityInstanceId);
                if (!link.startsWith("http")) {
                    if (!link.startsWith("/")) {
                        link = "/" + link;
                    }
                    link = base + link;
                }

                SlackMessage message = createMessage();
                try {
                    for (String username : users) {
                        workflowUserManager.setCurrentThreadUser(username);
                        WorkflowAssignment wfAssignment = null;
                        int count = 0;
                        do {
                            wfAssignment =
workflowManager.getAssignment(activityInstanceId);
                            if (wfAssignment == null) {
                                Thread.sleep(4000); //wait for assignment creation
                            }
                            count++;
                        } while (wfAssignment == null && count < 5); // try max 5
times
                        if (wfAssignment != null) {
                            String channel = getSlackUsername(username, wfAssignment);
                            if (channel != null && !channel.isEmpty()) {
                                message.setText(AppUtil.processHashVariable(text,
wfAssignment, null, null));
```

```
                                message.setAttachments(new
ArrayList<SlackAttachment>());
                                SlackAttachment attachment = new SlackAttachment();
                                attachment.setFallback(link);
                                if (urlName != null && !urlName.isEmpty()) {

attachment.setTitle(AppUtil.processHashVariable(urlName, wfAssignment, null, null));
                                } else {
                                    attachment.setTitle(linkLabel);
                                }
                                attachment.setTitleLink(link);
                                message.addAttachments(attachment);
                                try {
                                    LogUtil.info(SlackNotification.class.getName(),
"Sending slack message to " + username);
                                    sendMessage(channel, message);
                                    LogUtil.info(SlackNotification.class.getName(),
"Sending slack message completed to " + username);
                                } catch (Exception ex) {

LogUtil.error(UserNotificationAuditTrail.class.getName(), ex, "Error sending slack
message");
                                }
                            }
                        } else {
                            LogUtil.debug(UserNotificationAuditTrail.class.getName(),
"Fail to retrieve assignment for " + username);
                        }
                    }
                } catch (Exception e) {
                    LogUtil.error(UserNotificationAuditTrail.class.getName(), e,
"Error executing plugin");
                }
            }
        }).start();
    }

    protected SlackApi getApi() {
        if (api == null) {
            api = new SlackApi(getPropertyString("apiurl"));
        }
        return api;
    }

    protected String getSlackUsername(String username, WorkflowAssignment assignment)
{
        String syntax = getPropertyString("usernameTransform");
        syntax = syntax.replaceAll(StringUtil.escapeRegex("{username}"),
StringUtil.escapeRegex(username));
        return AppUtil.processHashVariable(syntax, assignment, null, null);
    }

    protected void sendMessage(String channel, SlackMessage message) {
        if (message == null) {
            message = createMessage();
        }
        if (channel != null && !channel.isEmpty()) {
            message.setChannel(channel);
        }
```

```
        getApi().call(message);
    }

    protected SlackMessage createMessage() {
        SlackMessage message = new SlackMessage();

        String username = getPropertyString("username");
        if (!username.isEmpty()) {
            message.setUsername(username);
        }

        String customIcon = getPropertyString("customIcon");
        if (!customIcon.isEmpty()) {
            if ("joget".equals(customIcon)) {
                HttpServletRequest request = WorkflowUtil.getHttpServletRequest();
                if (request != null) {
                    String url = request.getScheme() + "://" + request.getServerName()
+ ":" + request.getServerPort() + request.getContextPath() + "/images/v3/logo.png";
                    message.setIcon(url);
                }
            } else if ("url".equals(customIcon)) {
                message.setIcon(getPropertyString("iconUrl"));
            } else {
                message.setIcon(getPropertyString("iconEmoji"));
            }
        }


message.setUnfurlLinks("true".equalsIgnoreCase(getPropertyString("unfurl_links")));

message.setUnfurlMedia("true".equalsIgnoreCase(getPropertyString("unfurl_media")));
```

```
        return message;
    }
```

In our plugin properties, we have a button to send test message. Let implement the webService method to provide an API to send test message.

```
public void webService(HttpServletRequest request, HttpServletResponse response)
throws ServletException, IOException {
        boolean isAdmin =
WorkflowUtil.isCurrentUserInRole(WorkflowUserManager.ROLE_ADMIN);
        if (!isAdmin) {
            response.sendError(HttpServletResponse.SC_UNAUTHORIZED);
            return;
        }

        String action = request.getParameter("action");
        if ("sendTestMessage".equals(action)) {
            String message = "";
            try {
                AppDefinition appDef = AppUtil.getCurrentAppDefinition();

                String url = AppUtil.processHashVariable(request.getParameter("url"),
null, null, null, appDef);
                String testChannel =
AppUtil.processHashVariable(request.getParameter("testChannel"), null, null, null,
appDef);

                setProperty("apiurl", url);
                setProperty("text",
AppPluginUtil.getMessage("SlackWebhookTool.testMessage", getClassName(),
MESSAGE_PATH));

                if (testChannel != null && !testChannel.isEmpty()) {
                    sendMessage(testChannel, null);
                } else {
                    sendMessage(null, null);
                }

                message =
AppPluginUtil.getMessage("SlackWebhookTool.sendTestMessage.success", getClassName(),
MESSAGE_PATH);
            } catch (Exception e) {
                LogUtil.error(this.getClassName(), e, "Fail to send Test Message to
Slack");
                message =
AppPluginUtil.getMessage("SlackWebhookTool.sendTestMessage.fail", getClassName(),
MESSAGE_PATH) + "\n" + StringEscapeUtils.escapeJavaScript(e.getMessage());
            }
            try {
                JSONObject jsonObject = new JSONObject();
                jsonObject.accumulate("message", message);
                jsonObject.write(response.getWriter());
            } catch (Exception e) {
                //ignore
            }
        } else {
            response.setStatus(HttpServletResponse.SC_NO_CONTENT);
        }
    }
```

c. Manage the dependency libraries of your plugin

We need to include "jsp-api" and "slack-webhook" libraries in our POM file.

```
<!-- Change plugin specific dependencies here -->
        <dependency>
            <groupId>javax.servlet</groupId>
            <artifactId>jsp-api</artifactId>
            <version>2.0</version>
        </dependency>
        <dependency>
            <groupId>net.gpedro.integrations.slack</groupId>
            <artifactId>slack-webhook</artifactId>
            <version>1.1.1</version>
        </dependency>
        <!-- End change plugin specific dependencies here -->
```

d. Make your plugin internationalization (i18n) ready

We are using i18n message key in getLabel and getDescription method. We will use i18n message key in our properties options definition as well. Then, we will need to create a message resource bundle properties file for our plugin.

Create a directory, "resources/message", under "slack_webhook/src/main" directory. Then, create a "SlackWebhookTool.properties" file in the folder. In the properties file, add all the message keys and its label as below.

```
org.joget.SlackNotification.pluginLabel=Slack Notification
org.joget.SlackNotification.pluginDesc=Send notification message to Slack user when an
assignment is available.
SlackNotification.config=Configure Slack Notification
SlackNotification.url=Webhook URL
SlackNotification.from=From
SlackNotification.fromUsername=Username
SlackNotification.fromUsername.value=Joget Workflow
SlackNotification.customIcon=Custom Icon
SlackNotification.customIcon.none=None
SlackNotification.customIcon.joget=Joget Workflow Logo
SlackNotification.customIcon.url=Image URL
SlackNotification.customIcon.emoji=Emoji Code
SlackNotification.to=To
SlackNotification.usernameTransform=Transform username to Slack username
SlackNotification.usernameTransform.desc=Hash Variable can be used to transform
username to Slack username. Eg. @#form.slack.username[{username}]#
SlackNotification.usernameTransform.value=@{username}
SlackNotification.message=Message
SlackNotification.text=Text
SlackNotification.text.desc=Refer to <a href="https://api.slack.com/docs/formatting"
target="_blank">Slack Message Formatting</a>.
SlackNotification.unfurl_links=Unfurling Links
SlackNotification.unfurl_links.desc=Automatically find URLs in a message and create
attachments based on the content of those URLs
SlackNotification.unfurl_media=Unfurling Media
SlackNotification.unfurl_media.desc=Automatically find Media URLs in a message and
create attachments based on the media of those URLs
SlackNotification.sendTestMessage=Send Test Message
SlackNotification.sendTestMessage.testChannel=Test Channel
SlackNotification.sendTestMessage.success=Test message sent.
SlackNotification.sendTestMessage.fail=Fail to sent test message. Error:
SlackNotification.testMessage=Test Message
SlackNotification.viewAssignment=View Assignment
```

e. Register your plugin to the Felix Framework

Next, we will have to register our plugin class in the Activator class (Auto generated in the same class package) to tell the Felix Framework that this is a plugin.

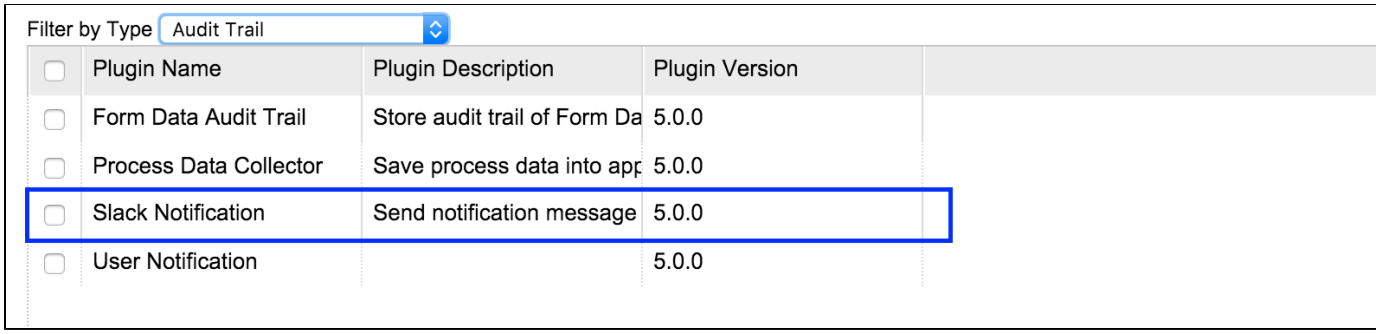
```
public void start(BundleContext context) {
        registrationList = new ArrayList<ServiceRegistration>();
        //Register plugin here

registrationList.add(context.registerService(SlackNotification.class.getName(), new
SlackNotification(), null));
    }
```

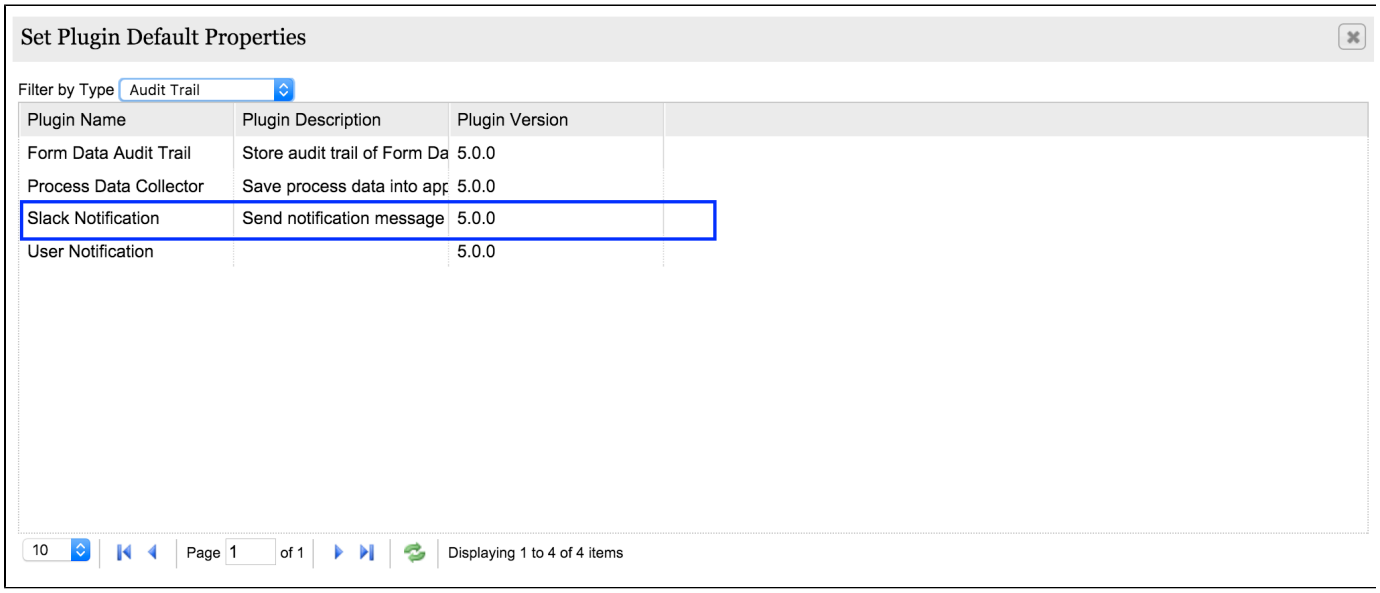
f. Build it and test

Let's build our plugin. Once the building process is done, we will find a "slack_notification-5.0.0.jar" file created under "slack_notification/target" directory.

Then, let's upload the plugin jar to Manage Plugins. After uploading the jar file, double check that the plugin is uploaded and activated correctly.



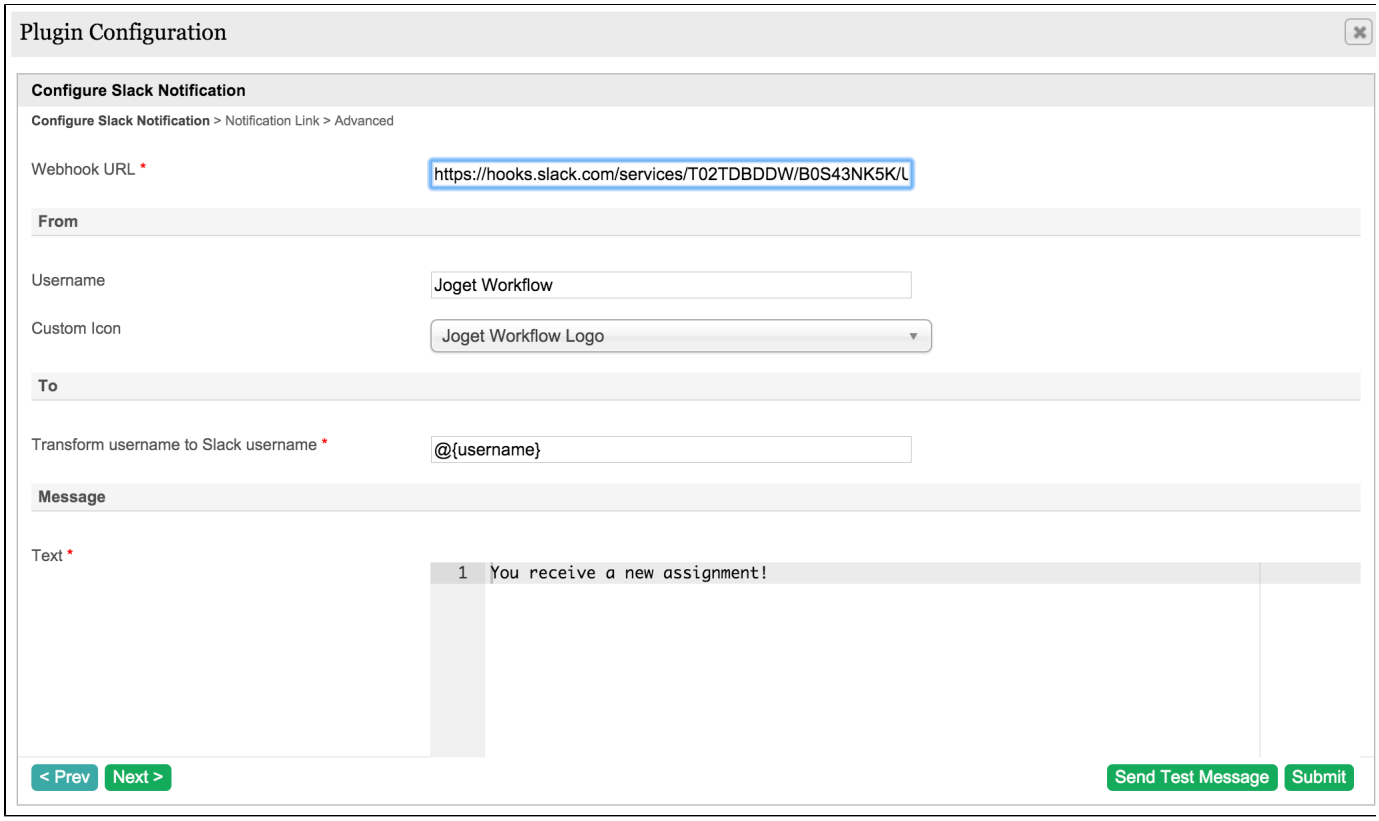
Check the Slack Notification plugin is available in Plugin Default Properties.

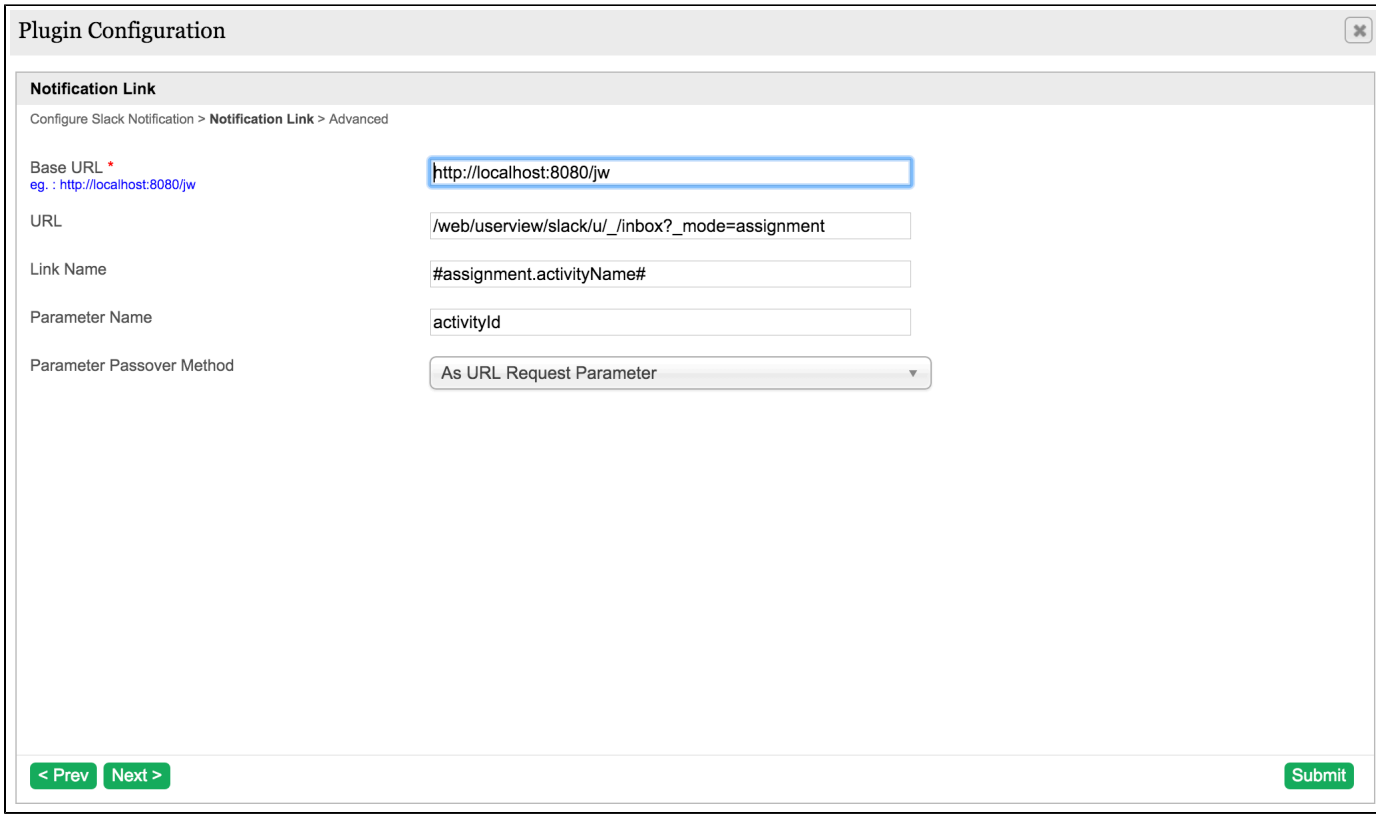


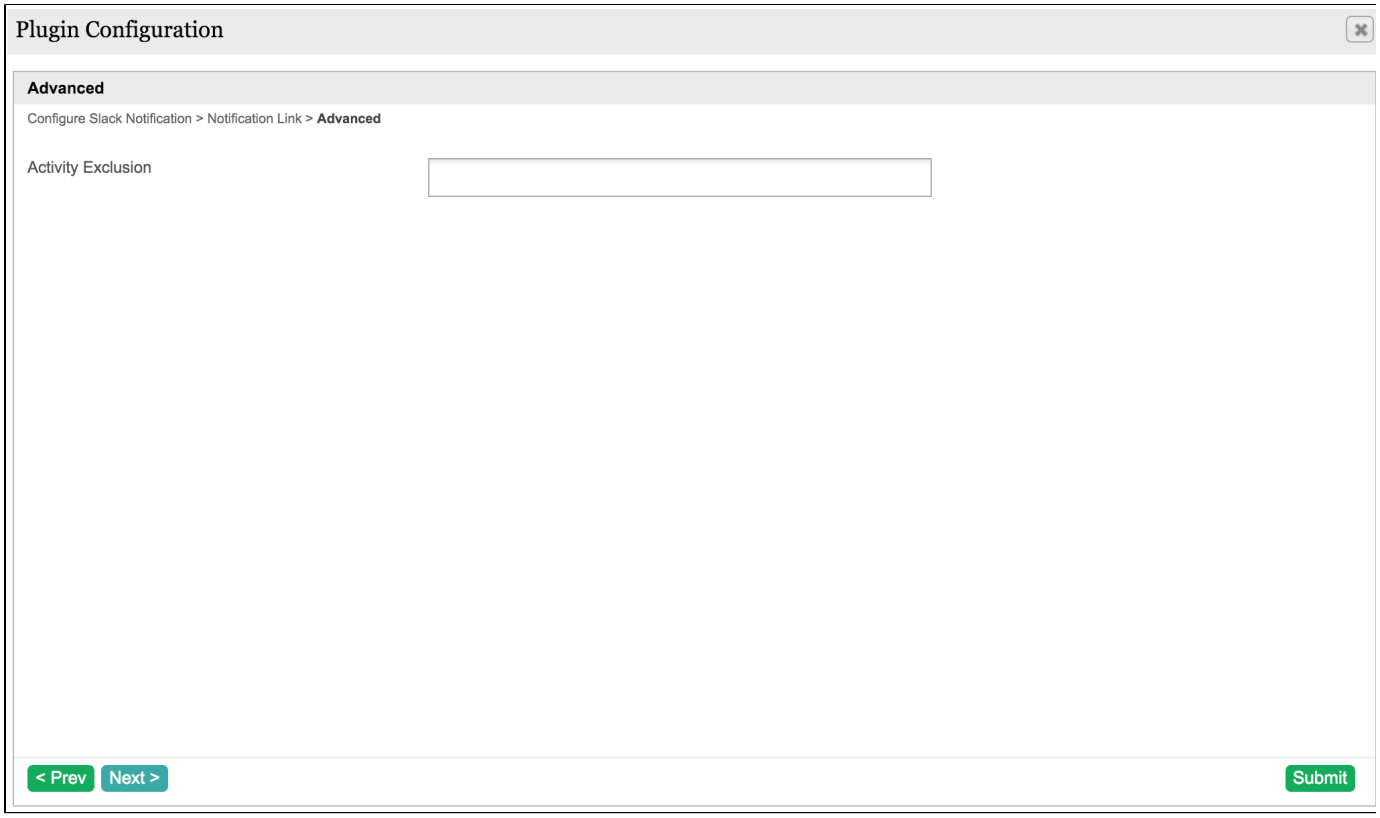
Now, let us configure the Incoming Webhooks in Slack platform.

1. Go to *your_team.slack.com/services/new*.
2. Search for *Incoming WebHook* and click in `Add`
3. Choose Channel to Post and press `Add Incoming WebHooks Integration`
4. Into *Setup Instructions*, you've a WebHook URL. This is the argument will use for the "Webhook URL" later. Then, copy it.

Configure the Slack Notification plugin. We can see the properties options are quite similar to User Notification plugin.


Plugin Configuration
Configure Slack Notification
Configure Slack Notification > Notification Link > Advanced
Webhook URL *
https://hooks.slack.com/services/T02TDBDDW/B0S43NK5K/L
From
Username
Joget Workflow
Custom Icon
Joget Workflow Logo
To
Transform username to Slack username *
@{username}
Message
Text *
1 You receive a new assignment!
< Prev
Next >
Send Test Message
Submit


Plugin Configuration
Notification Link
Configure Slack Notification > Notification Link > Advanced
Base URL *
eg. : http://localhost:8080/jw
http://localhost:8080/jw
URL
/web/userview/slack/u/_/inbox?_mode=assignment
Link Name
#assignment.activityName#
Parameter Name
activityId
Parameter Passover Method
As URL Request Parameter
< Prev
Next >
Submit



When test running a process, the message is received in Slack once a new assignment is created.

8. Take a step further, share it or sell it

You can download the source code from slack_notification_src.zip.

To download the ready-to-use plugin jar, please find it in http://marketplace.joget.org/. (Coming Soon)