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Lab Guide

Orchestration 201:

Core Capabilities

Jun Zhou & Jesse Schulman

Default Login / Password:

admin / Knowledge15

itil / Knowledge15

employee / Knowledge15

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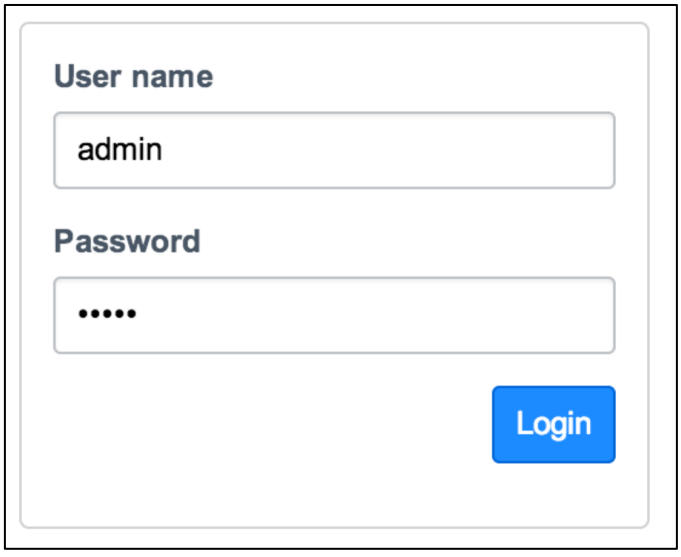
Lab Goal

This lab explains how to build an Orchestration workflow to automate the manual installation of an application to a web server, customize the home page, and verify the installation visually.

Lab 1
Create Subflow

Log on to Your Training Instance

1. Navigate to the unique instance URL provided to you.
2. Log in using the **admin** credentials provided on the cover.



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Understand Our Starting Point

Examine the initial workflow.

1. Navigate to **Orchestration > Workflow Editor**.
2. Click **Workflows** tab on right of the workflow editor.
3. Click **K15 – Order Application** to open the workflow.

   This workflow:

   - Obtains approval from the requestor's manager.
   - When the request is approved, it checks how many licenses are available and decides if it needs to acquire more licenses.
   - If a license is acquired, it creates an application installation task.
   - Once the application is installed, it creates an application verification task.

   Our goal:

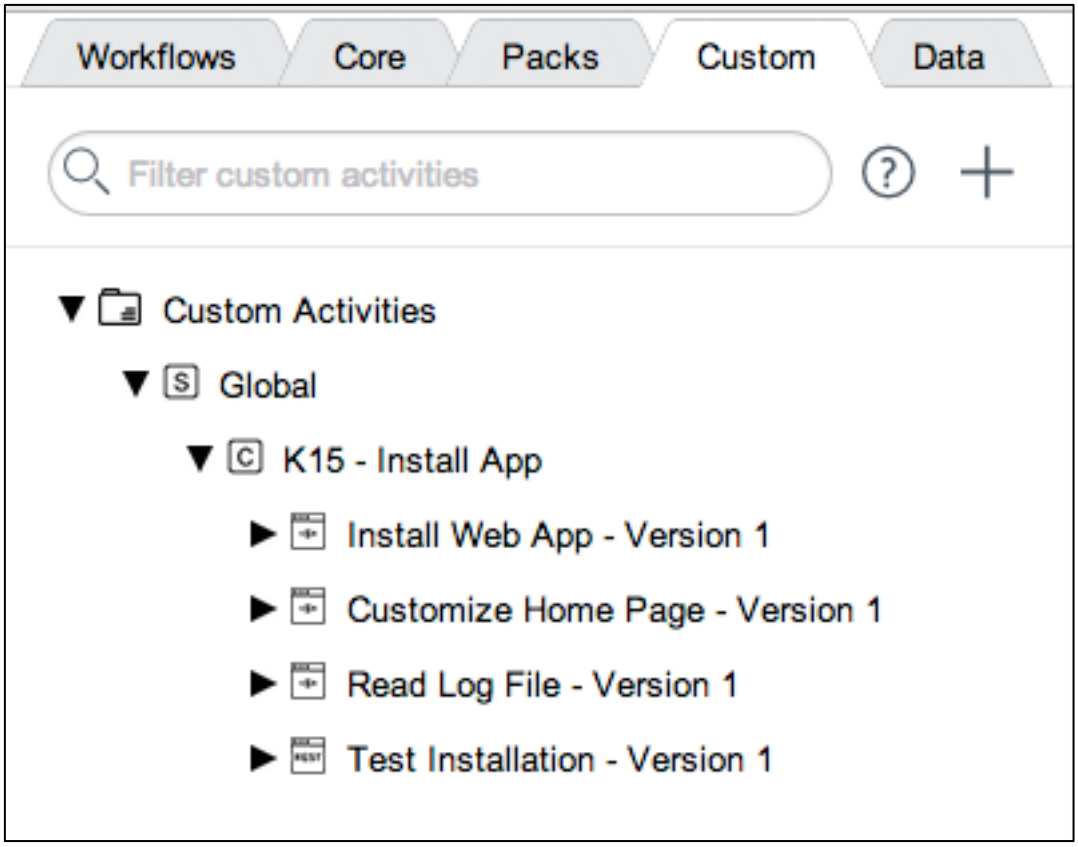
   - Replace the last two manual tasks with automation to install the application and test that the application was installed successfully. We create a subflow to perform the tasks automatically and incorporate the subflow into this workflow.

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Understand Custom Activities

There are four custom activities built to perform the tasks.

1. In workflow editor, click **Custom** tab. Expand **Custom Activities – > Global -> K15 – Install App**. The four custom activities appear in the list.



2. Custom activity **Install Web App**: The activity accepts target hostname and application name as input parameters. It uses SSH provider to run the install script **/install_app_node.sh** which locates at **/usr/local/bin**. The install script installs a node on the Apache web server. The node name is specified by the input parameter.

3. Custom activity **Customize Home Page**: The activity accepts target hostname, application name and home page contents as input parameters. It uses SSH provider to write the home page contents into **index.html file** which locates at **/var/www/html**.

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4. Custom activity **Read Log File**: The activity accepts target hostname and log file name as input parameters. It uses SSH provider to read the log file which locates at **/usr/local/bin**. The file contents are saved into activity output **contents**.

5. Custom activity **Test Installation**: The activity accepts application name as input parameters. It uses the REST provider to send message to the endpoint specified in web service message and process its response.

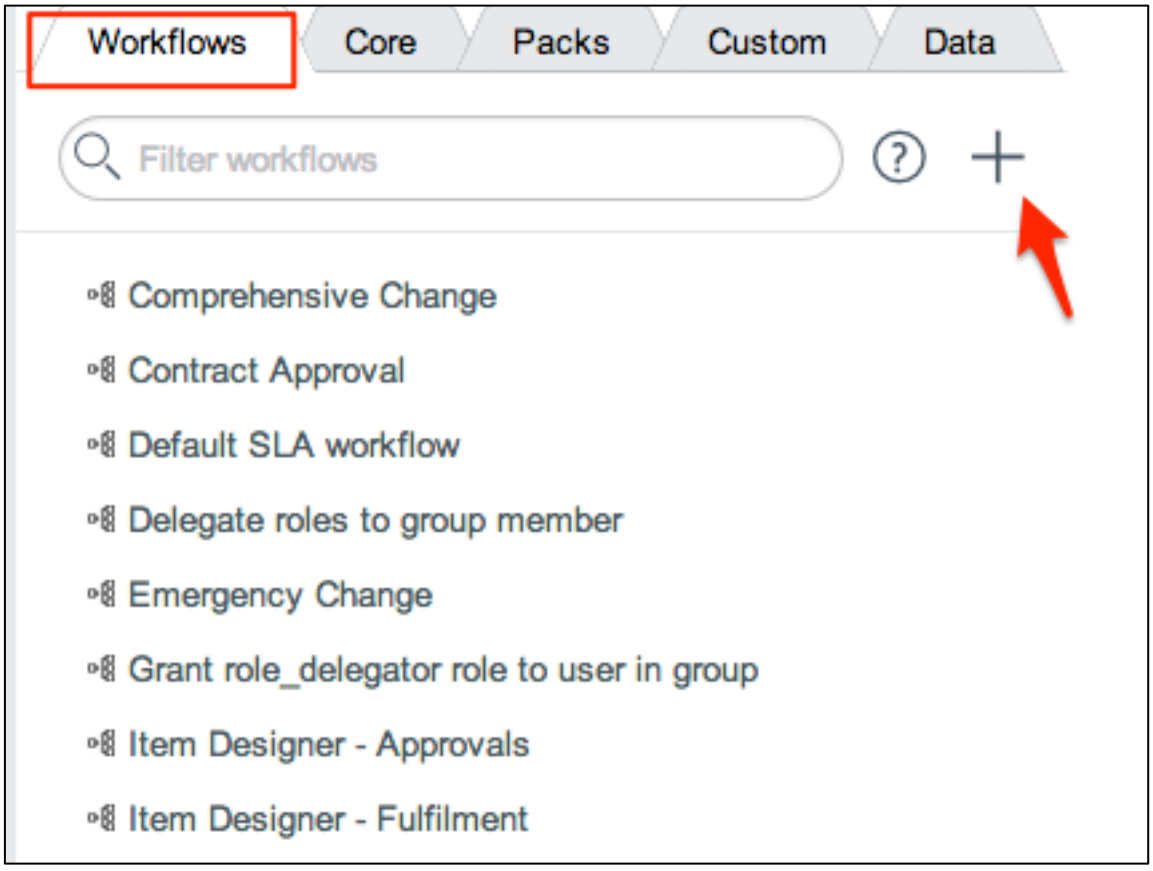
6. These custom activities are pre-created and loaded onto the lab instance, in order to perform the auto-installation tasks.
   Do you want to know how to create Orchestration custom activity? Get more information at the lab "**Orchestration 301: Design Your Own Reusable Activities**" or visit wiki activity designer section.

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Create the Subflow

A subflow is really just a workflow.

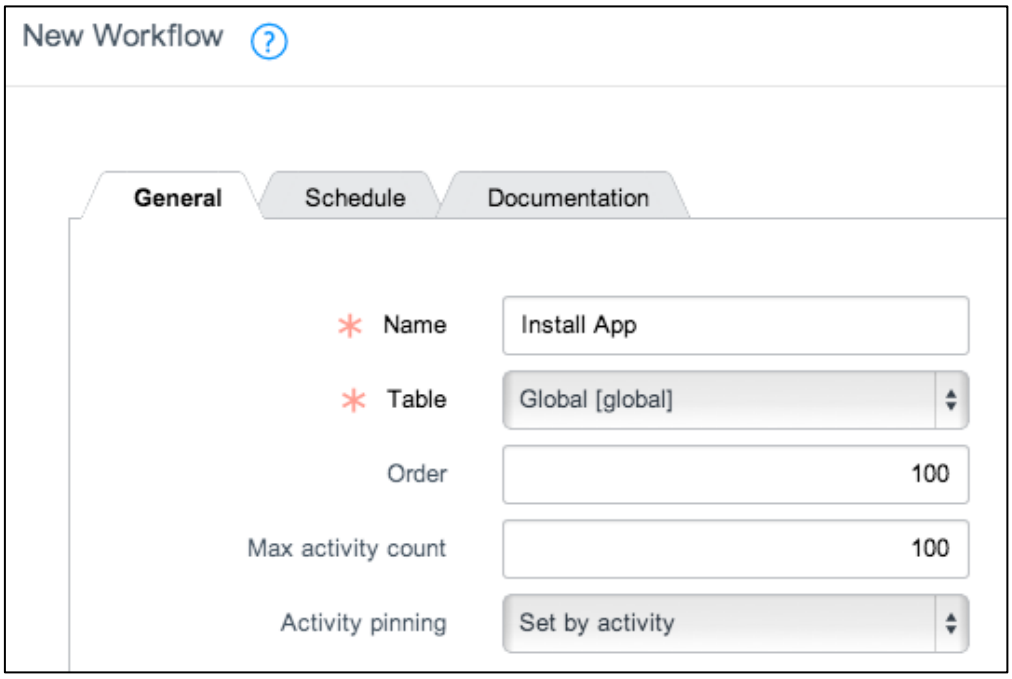
1. Create the subflow: navigate to **Orchestration > Workflow Editor**.
2. Select **Workflows** tab.
3. Click + to create a new workflow.



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4. Enter or select the following:

   Name: **Install App**
   Table: **Global [global]**
   Leave all the default values in the other fields.



5. Click **Submit**.

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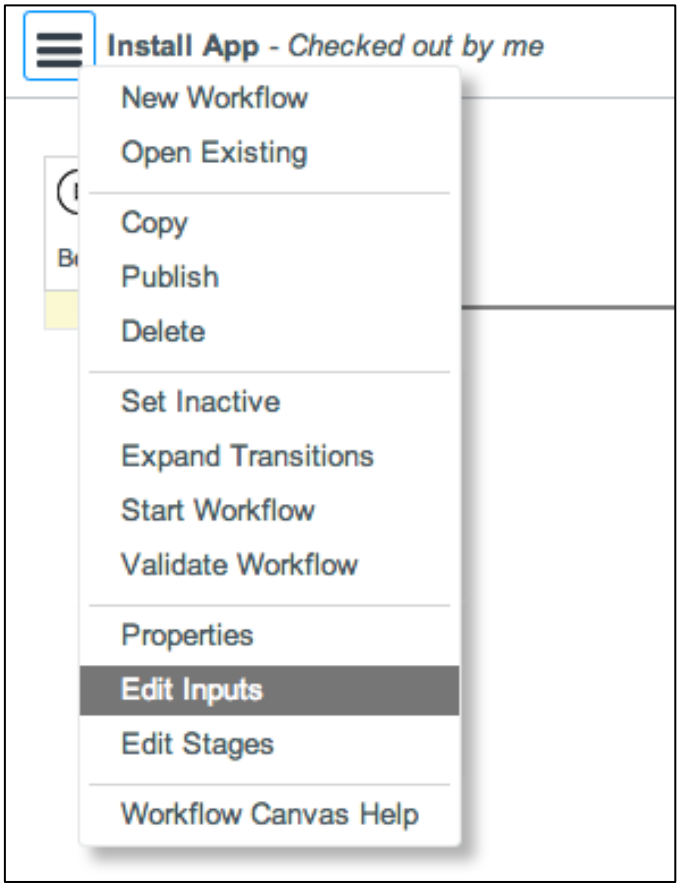
Add Input Variables

The subflow takes three input variables:

- The IP address of the target server on which the application installs.
- A string parameter required by the installation script that is called on the target server.
- The web application home page.

1. Click the hamburger menu  at left upper of the workflow canvas.

2. Select **Edit Inputs**.

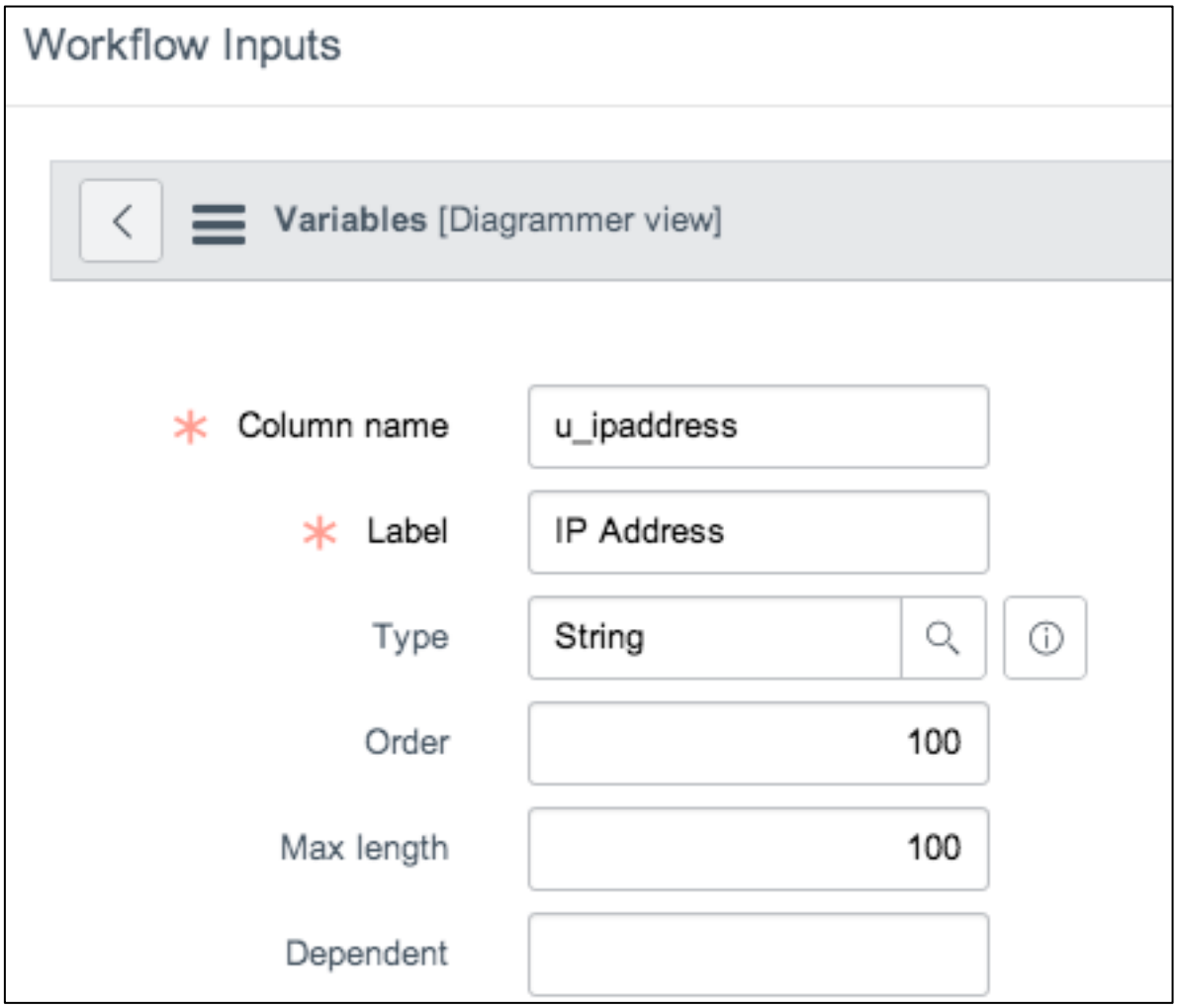


3. Click **New**.

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4. Enter or select the following:

   Column name: **u_ipaddress**
   Label: **IP Address**
   Type: **String**
   Order: **100** (leave alone)
   Max length: **100**

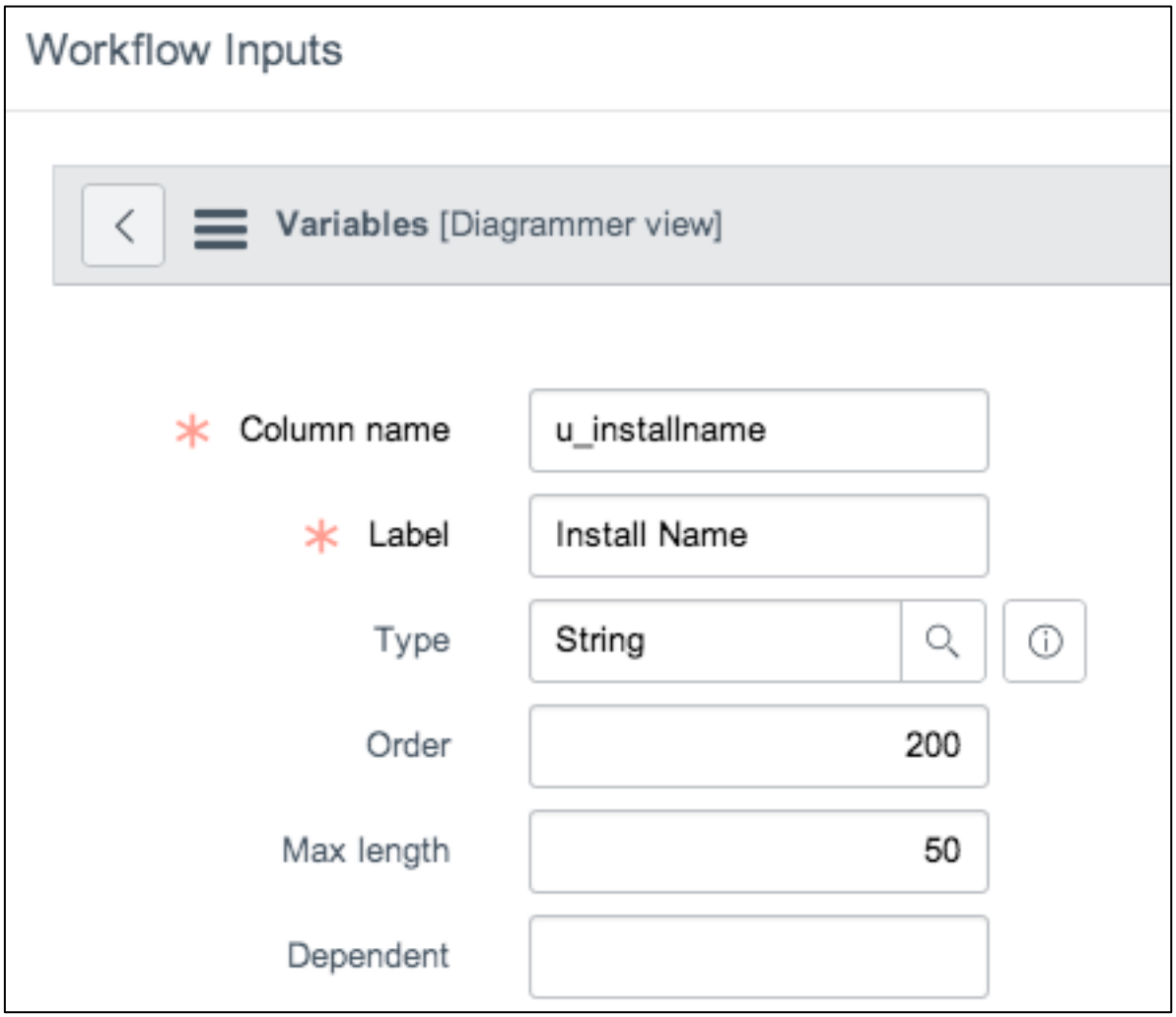


5. Click **Submit**.

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6. Repeat steps 3 through 5, entering:

   Column name: **u_installname**
   Label: **Install Name**
   Type: **String**
   Order: **200**
   Max length: **50**

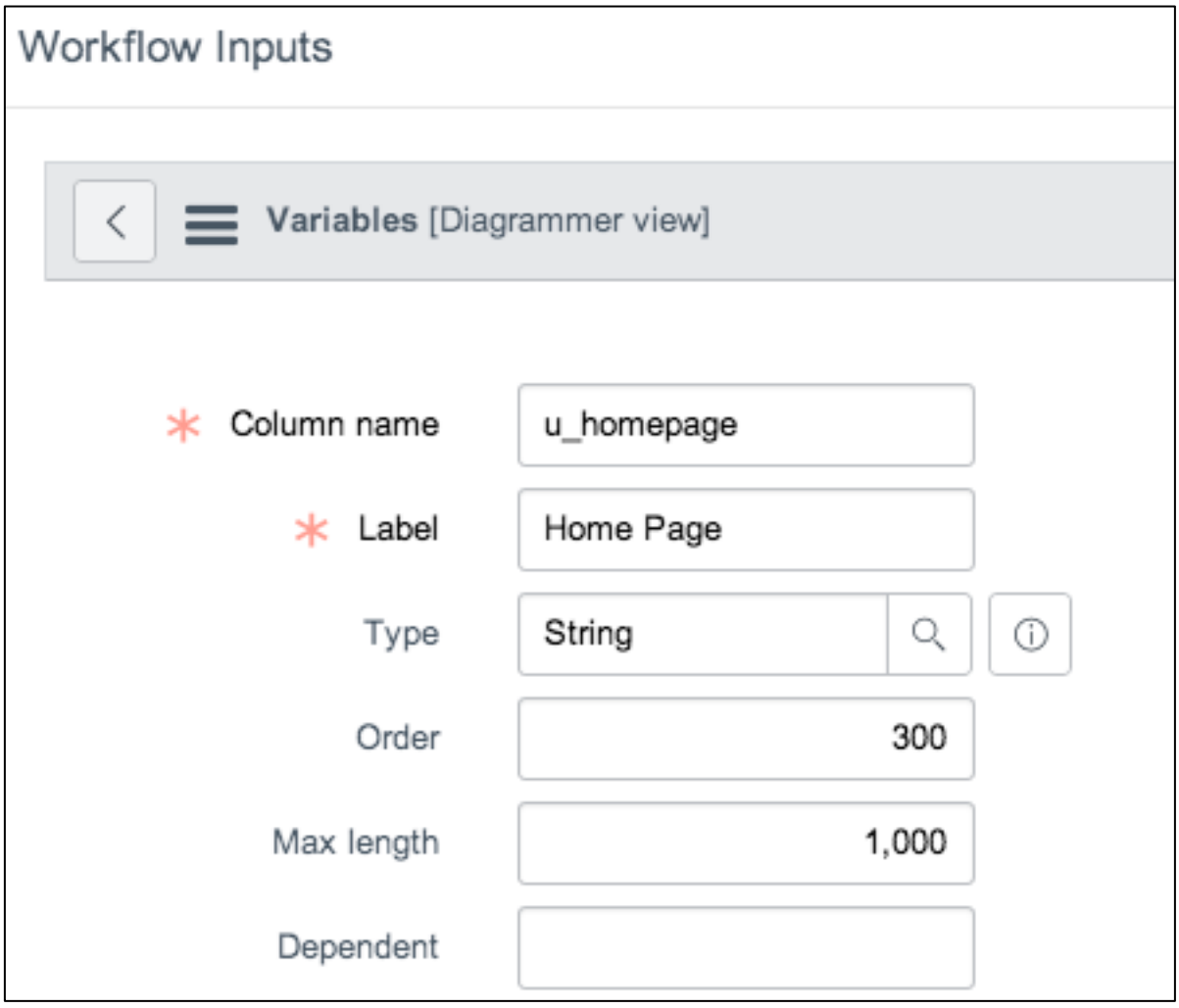


7. Click **Submit**.

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8. Repeat steps 3 through 5, entering:

   Column name: **u_homepage**
   Label: **Home Page**
   Type: **String**
   Order: **300**
   Max length: **1000**



9. Click **Submit**.

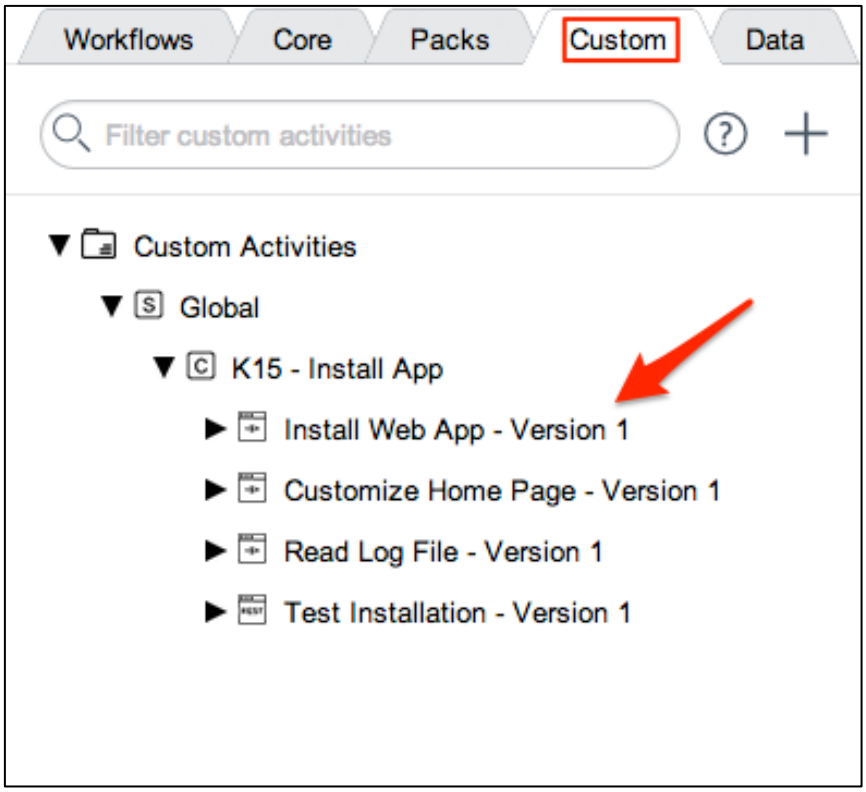
10. Click the little **X** in the upper right of the Workflow Inputs window to close it and return to the workflow canvas.

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Add Install Web App Activity

Configure this custom activity to run the install script on the target system.

1. Click **Custom** tab on the right side of the workflow editor.
2. Expand **Custom Activities – > Global -> K15 – Install App**.

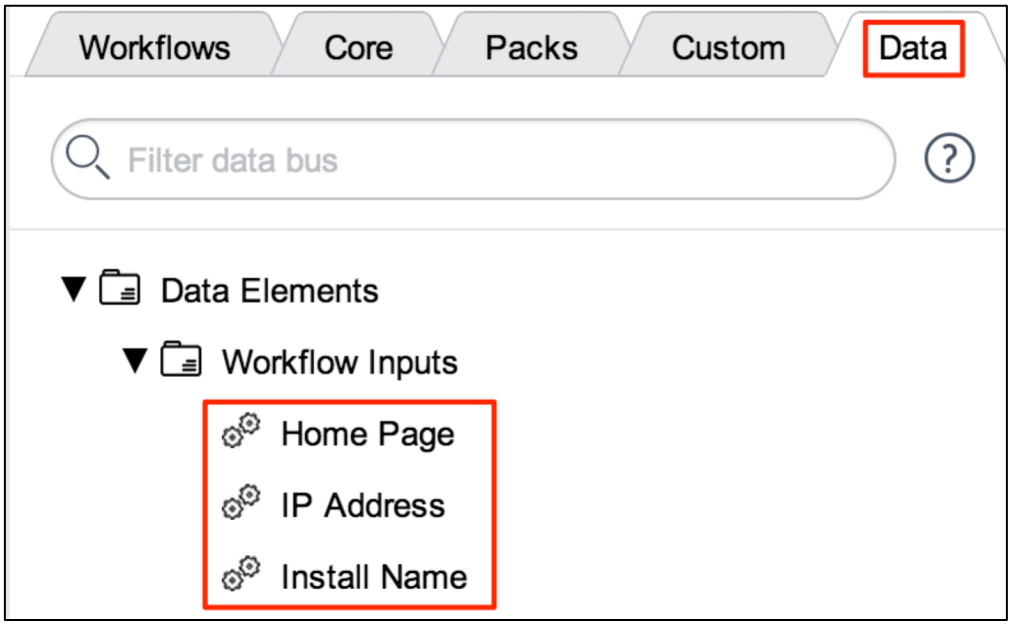


3. Drag **Install Web App** onto the transition between **Begin** and **End**.
4. Enter the following for the activity variable:

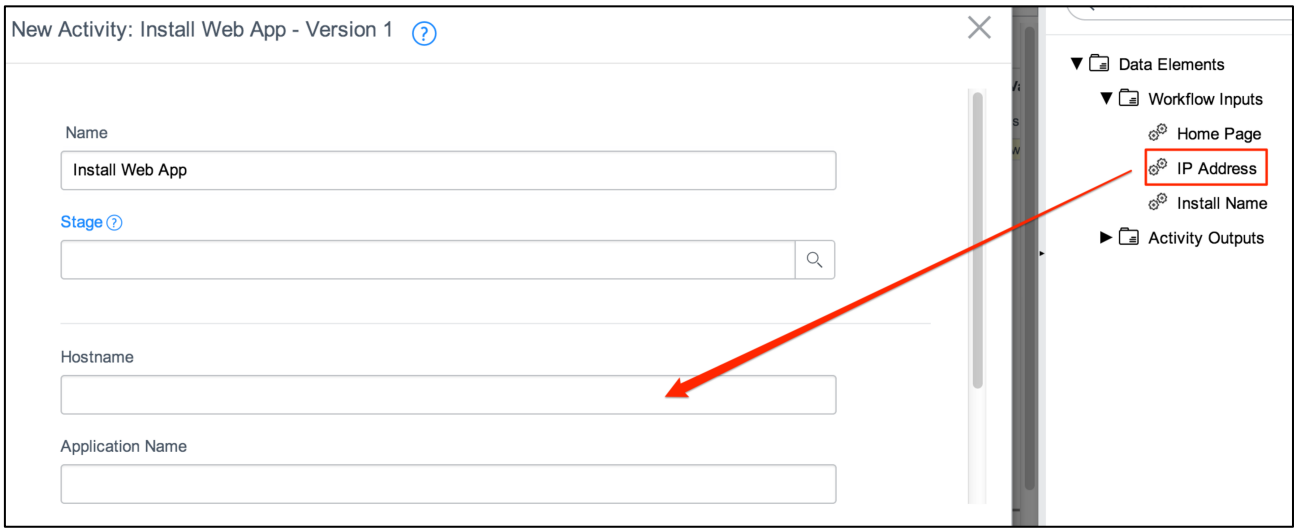
   Name: **Install Web App**

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5. Set up activity input variables using data form Data tab. Workflow inputs are available on Data bus. Click **Data** tab. Expend **Data Elements -> Workflow Inputs.** The workflow inputs are listed.

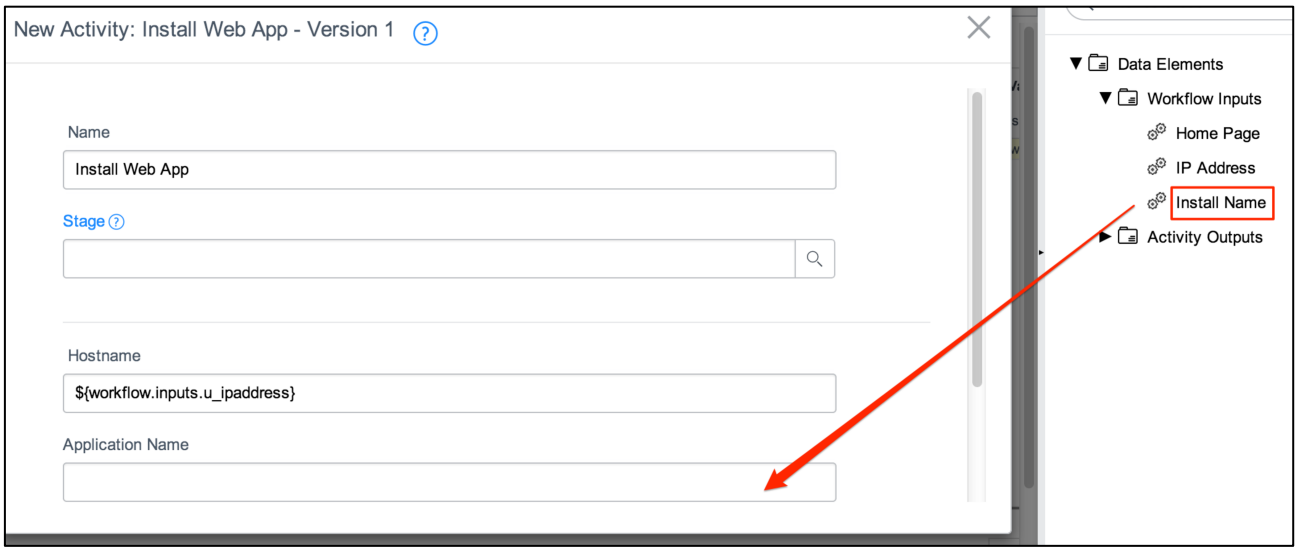


6. Drag **IP Address** from **Data** tab and drop at **Hostname** activity input field.



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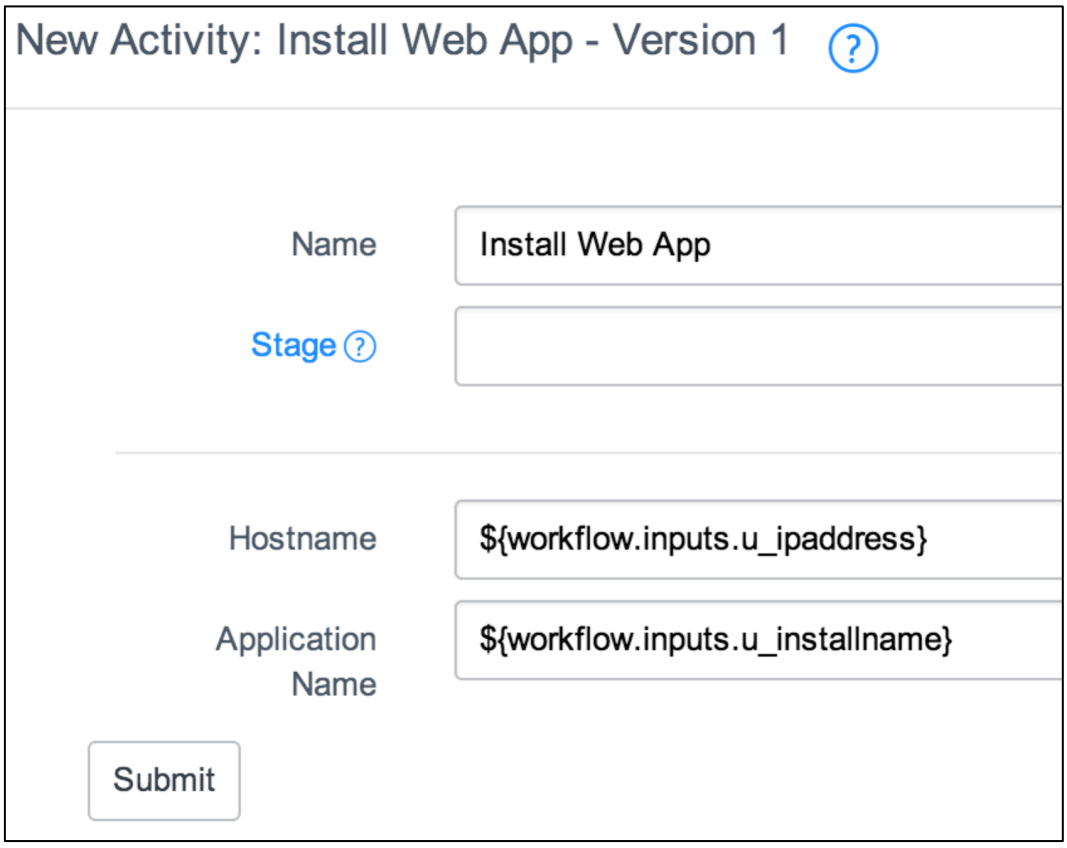
7. Drag **Install Name** from **Data** tab and drop at **Application Name** activity input field.



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8. Verify the activity inputs as the following:

   Name: **Install Web App**
   Hostname: **${workflow.inputs.u_ipaddress}**
   Application Name: **${workflow.inputs.u_installname}**



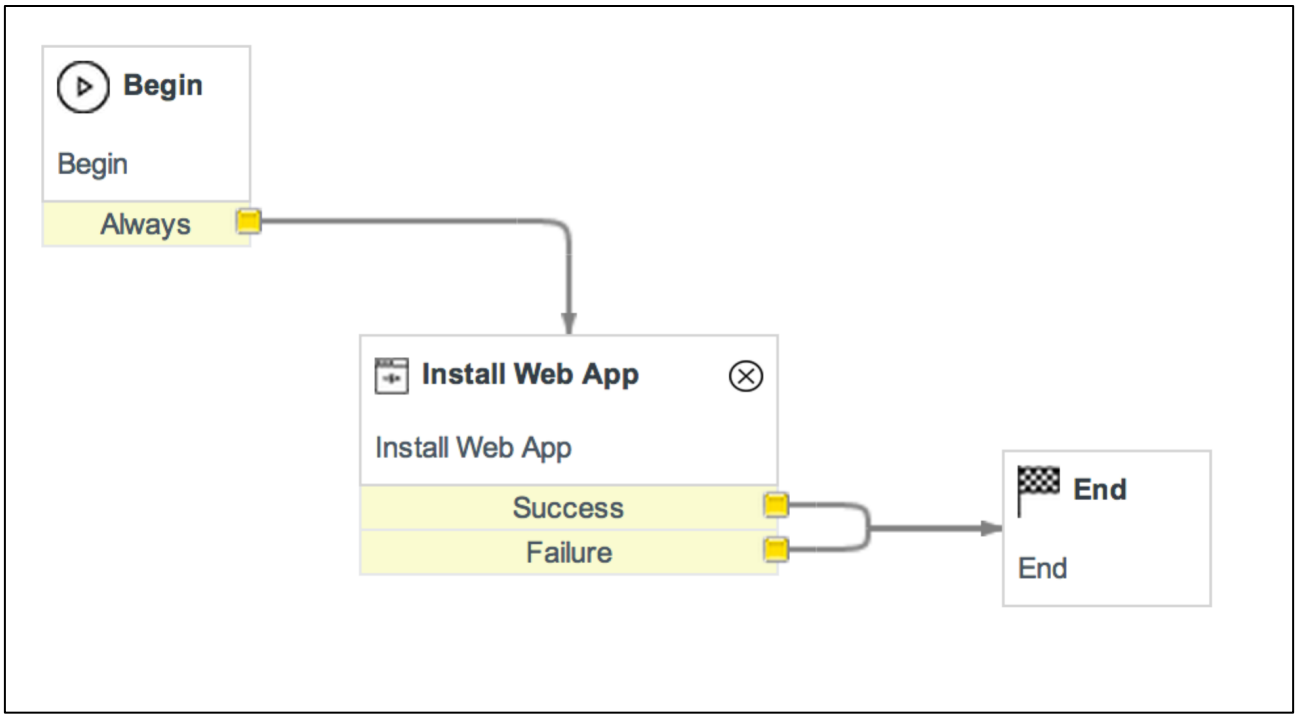
9. Click **Submit**.

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10. Make transitions from:

    Begin to **Install Web App**
    Install Web App Success to **End**
    Install Web App Failure to **End**

    The workflow appears as shown.



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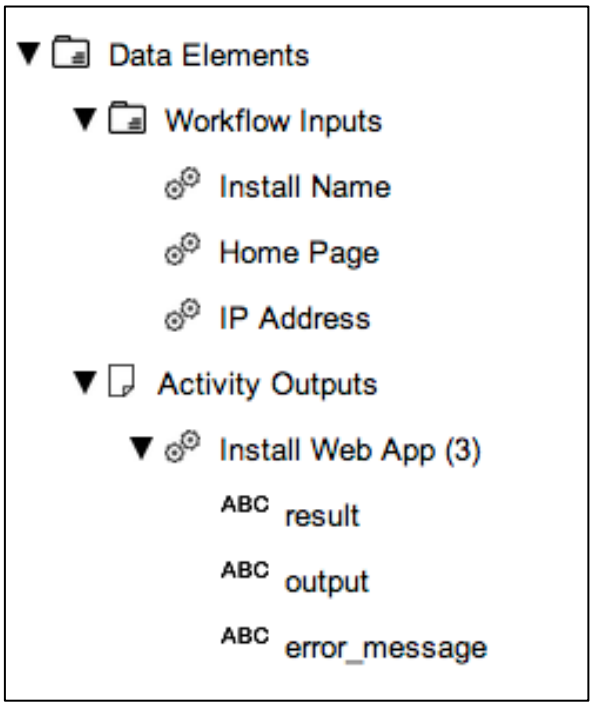
Understand Workflow Data

1. Workflow Data tab lists workflow inputs and all custom activities used in the current workflow that produce data. The Data tab is a graphical representation of the workflow databus, which manages all the temporary data used by the current workflow.

2. Activities are categorized by application in this tab and are available for use as data sources for other activities. Drag Workflow Inputs or activity output variables from an activity in this tab into the inputs of another activity on the workflow canvas to link the activities together. For activity outputs, an index number in parenthesis after the activity name provides a unique identifier for the parameters that you use as input data in other activities.

3. When you drag a custom activity into the workflow canvas, the system adds that activity and its output data to the structure.

4. Take a look at the Data of the workflow. It lists the workflow inputs. It also lists the custom activity Install Web App and its output. You can drag the output and drop it to another activity input to let data flow between the activities.

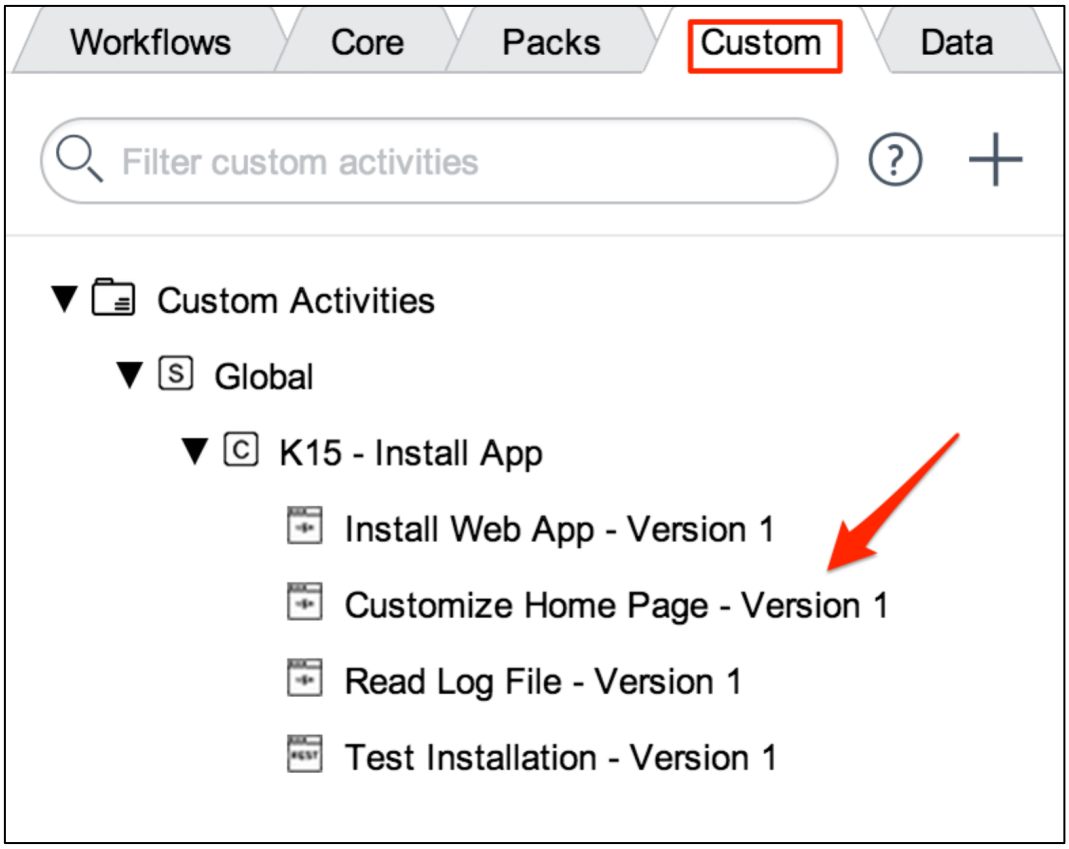


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Add Install Web App Activity

We configure this custom activity to update web home page.

1. Click **Custom** tab on the right side of the workflow editor.
2. Expand **Custom Activities -> Global -> K15 – Install App**.



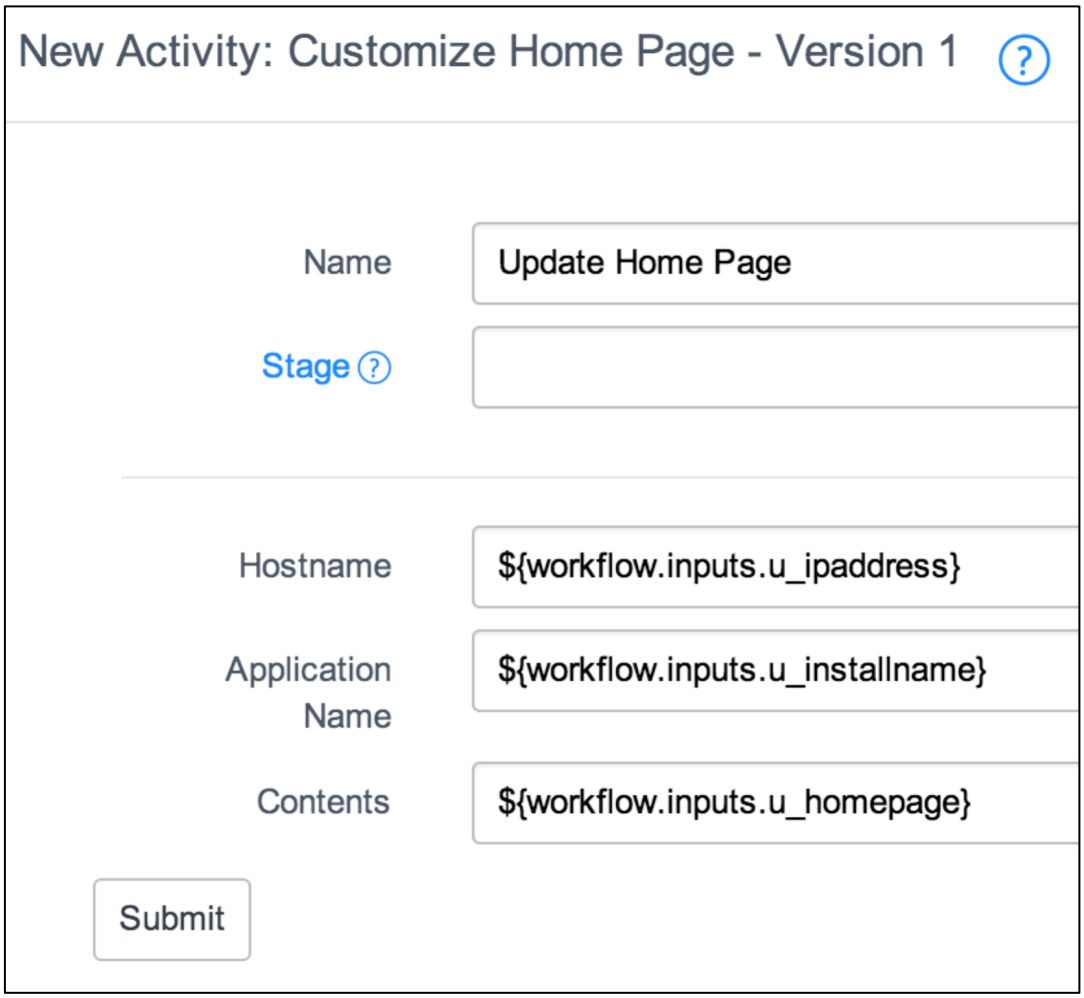
3. Drag **Customize Home Page** onto the transition between Success condition of **Install Web App** and **End**.
4. Enter the name for the following activity variable:

   Name: **Update Home Page**

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5. Drag the data from **Data** tab and drop to the following activity variables:

   Hostname: **${workflow.inputs.u_ipaddress}**
   Application Name: **${workflow.inputs.u_installname}**
   Contents**: ${workflow.inputs.u_homepage}**



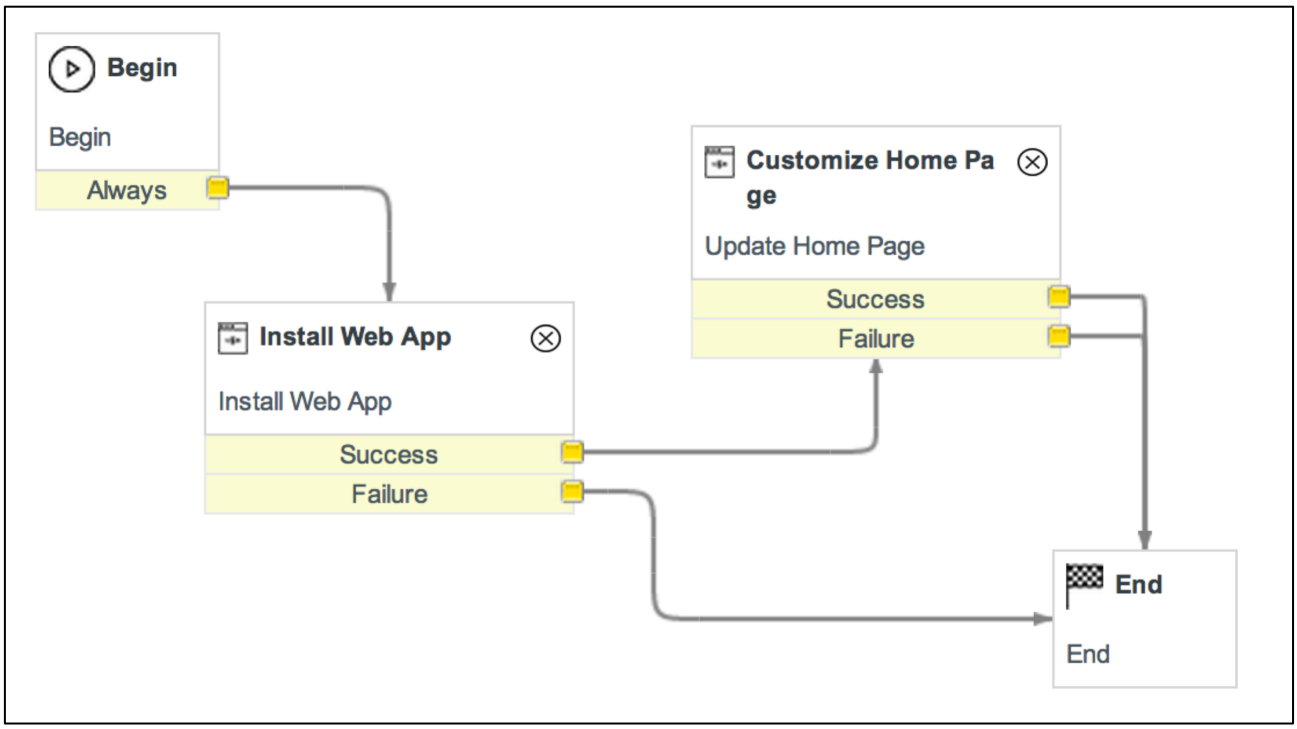
6. Click **Submit**.

7. Make transitions from:

   Install Web App Success to **Customize Home Page**
   Customize Home Page Success to **End**
   Customize Home Page Failure to **End**

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8. Confirm that the workflow is connected and appears as shown.

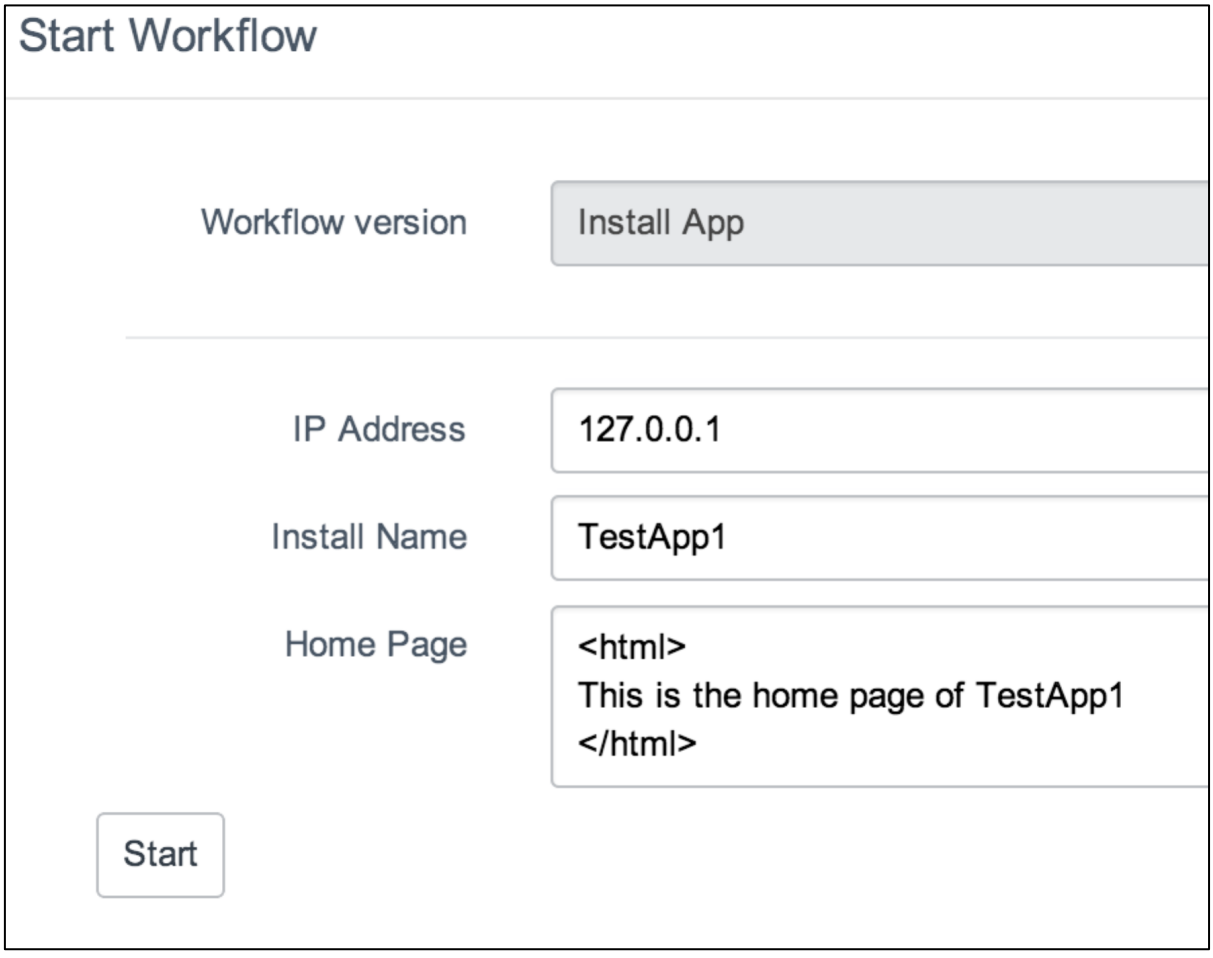


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Test Workflow

1. Click the run workflow start button  at right corn of the workflow canvas.
2. Enter the following information:

   IP Address: **127.0.0.1**
   Install Name: **TestApp1**
   Home Page: **<html>This is the home page of TestApp1</html>**



3. Click **Start**.

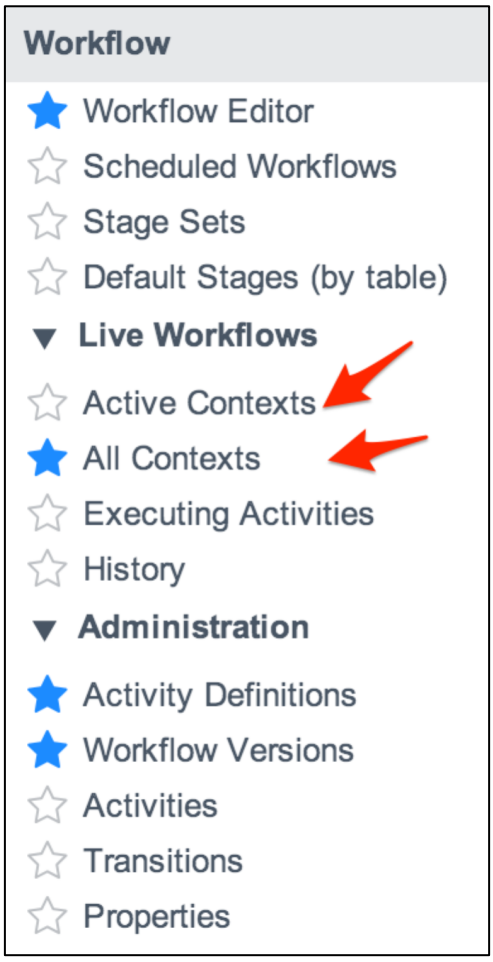
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Check Workflow Status and Getting Information About What Ran

There are multiple ways to observe the workflow status:

1. Refresh the visible workflow using the refresh button on the upper right . When the workflow has finished running, a transition leads to **End**.

2. Also check the workflow context. Navigate to **Workflow > Active Contexts**. While the workflow is still running, its context record appears in this list. If it has already completed, you can find it in the **All Contexts** module. To get there, navigate to **Workflow > All Contexts.**



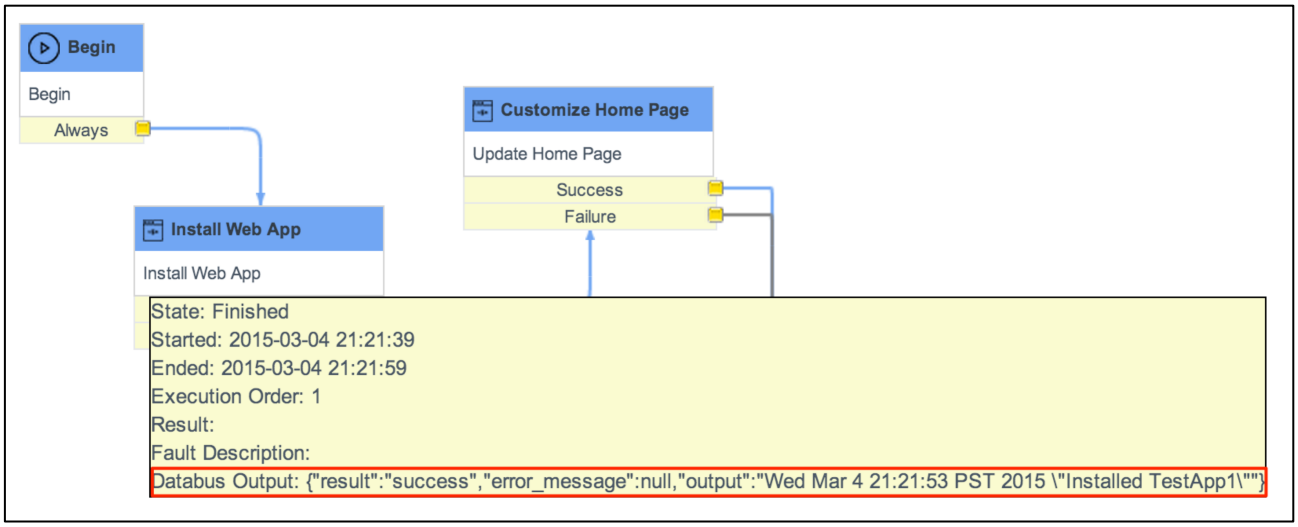
3. Click the timestamp under **Started** for the test run – the Workflow version is **Install App**.

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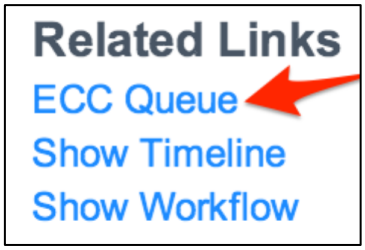
4. Under Related Links, click the link for **Show Workflow**.



5. Workflow context display on canvas. Hover over the activity **Install Web App**. The activity executing result displays. Examine the activity execution result.



6. Under **Related Links**, click the link for **ECC Queue**. The ECC (External Communication Channel) Queue is the table that the MID (Management, Instrumentation, and Discovery) Server and the ServiceNow instance communicate through. Output records contain instructions that the MID Server will execute. Input records contain the results of the instructions run.



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7. Select the input record from the viewpoint of the ECC Queue. The payload in ECC Queue input record tells the instance the result of execution.

Created	Agent	Topic	Name	Source	Queue	State
2015-03-04 21:21:40	mid.server.lab_midserver	SSHCommand	cd /usr/local/bin ./install_app_node.sh ...	127.0.0.1	output	processed
2015-03-04 21:21:54	mid.server.lab_midserver	SSHCommand	cd /usr/local/bin ./install_app_node.sh ...	127.0.0.1	input	processed
2015-03-04 21:21:59	mid.server.lab_midserver	SSHCommand	cd /var/www/html/TestApp1 cat > index.ht...	127.0.0.1	output	processed
2015-03-04 21:22:07	mid.server.lab_midserver	SSHCommand	cd /var/www/html/TestApp1 cat > index.ht...	127.0.0.1	input	processed

8. For a formatted view of the payload, click the XML button next to the payload field.

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
▼<results probe_time="2730">
  ▼<result>
    <output>Wed Mar 4 21:21:53 PST 2015 "Installed TestApp1"</output>
   </result>
  ▼<parameters>
     <parameter name="queue" value="output"/>
     <parameter name="must_sudo" value="true"/>
     <parameter name="from_sys_id" value=""/>
     <parameter name="aka" value="10.197.68.168"/>
     <parameter name="multiline_cmd" value="cd /usr/local/bin ./install_app_node.sh
     TestApp1"/>
```

The value of the output field contains what was written to **stdout** as a result of executing the script in the Install Web App activity.

Visual Verification of Installation

The installation script installs a new web node to the Apache Server. Look at that page to confirm its successful installation.

1. Open a new tab in the web browser.

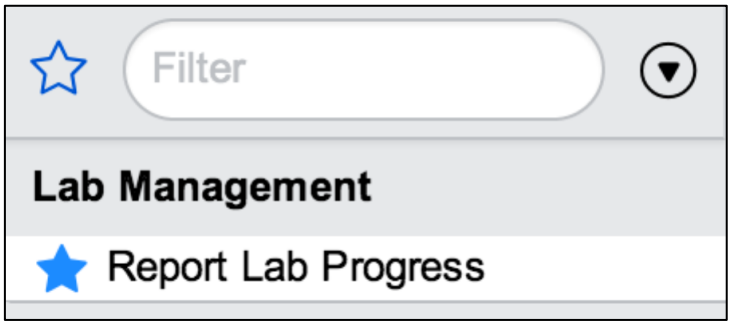
2. Enter the URL for your lab instance using **http** instead of https and add "**:80/TestApp1**". For example: **http://orch201-seat1.lab.service-now.com:80/TestApp1. orch201-seat1** is a placeholder for the instance URL provide to you.

3. The home page should display the message: **This is the home page of TestApp1**

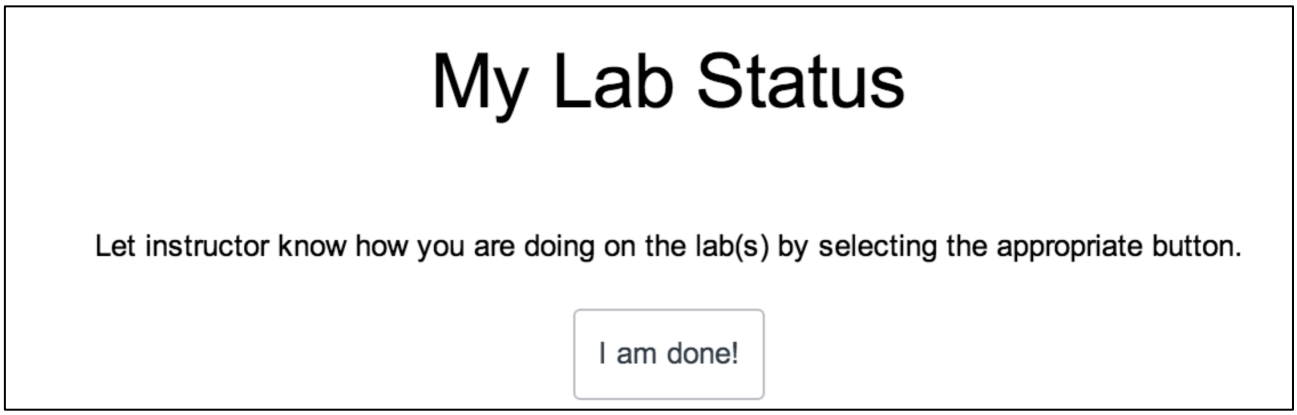
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Progress Report

1. Navigate to **Lab Management**> **Report Lab Progress.**



2. Click **I am done!**



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Lab Goal

This lab explains how to define REST Message to test the web application. In the lab, you create custom REST Message activity and integrate into subflow to programmatically verify the installation.

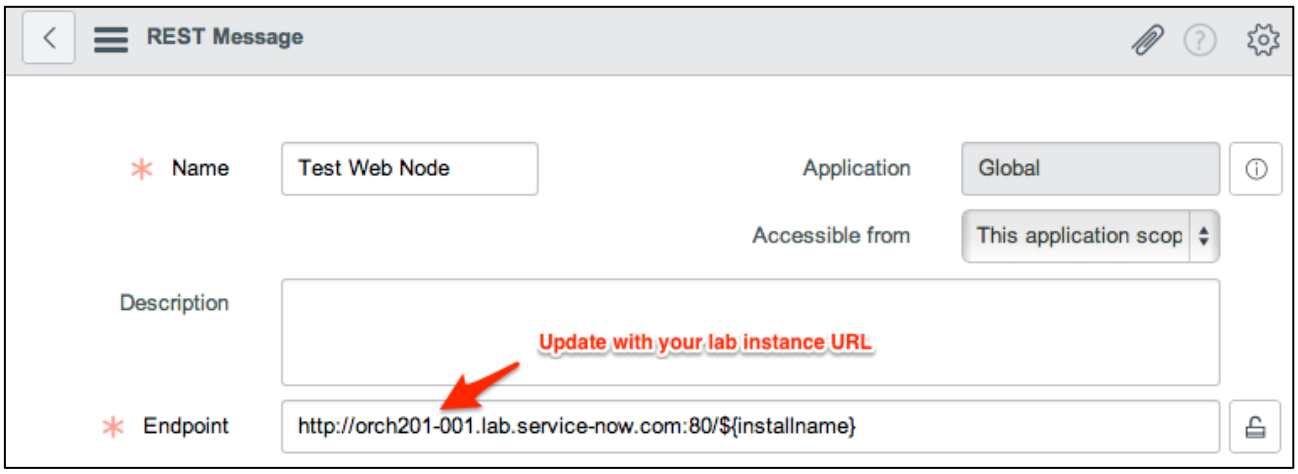
Lab 2
Verify Web App Installation Programmatically

Define the Verification Mechanism

Visually verifying the installation is acceptable; however, verification can be done automatically, using the ServiceNow REST web services capabilities.

1. Navigate to **System Web Services > REST Message**.
2. Click **New**
3. Enter the following:

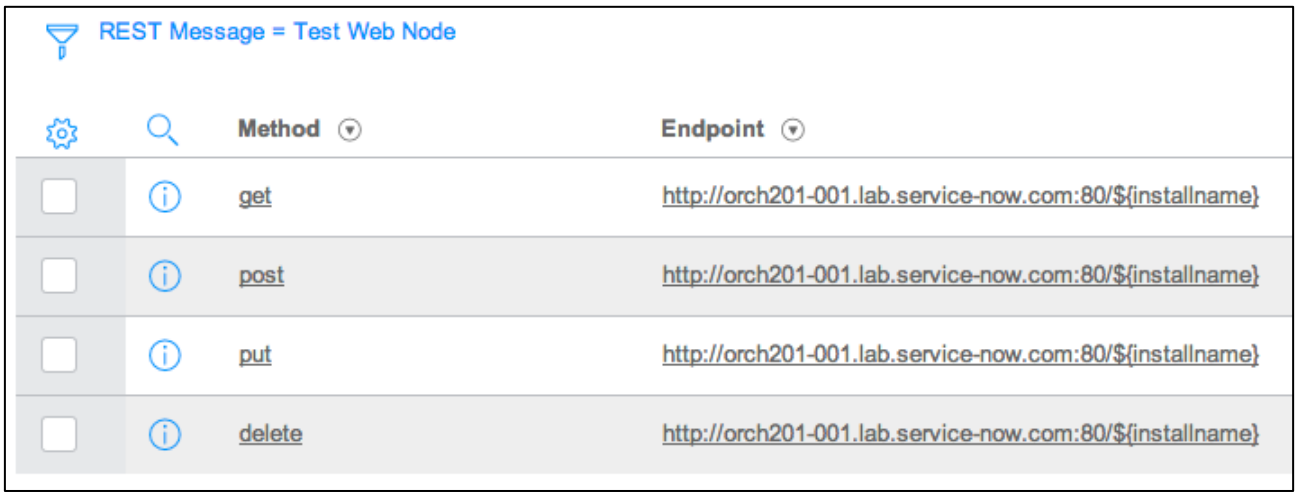
   Name: **Test Web Node**
   Endpoint: **http://orch201-seat1.lab.service-now.com:80/${installname}**
   Note: Use http, not https. **orch201-seat1** is a placeholder for the instance URL provide to you.



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4. Click **Submit**.

5. Click on the newly created record. Note there are 4 REST Message Methods that have been automatically created.



6. Click **get** method.

7. On the related list **Variable Substitutions,** click **New**.

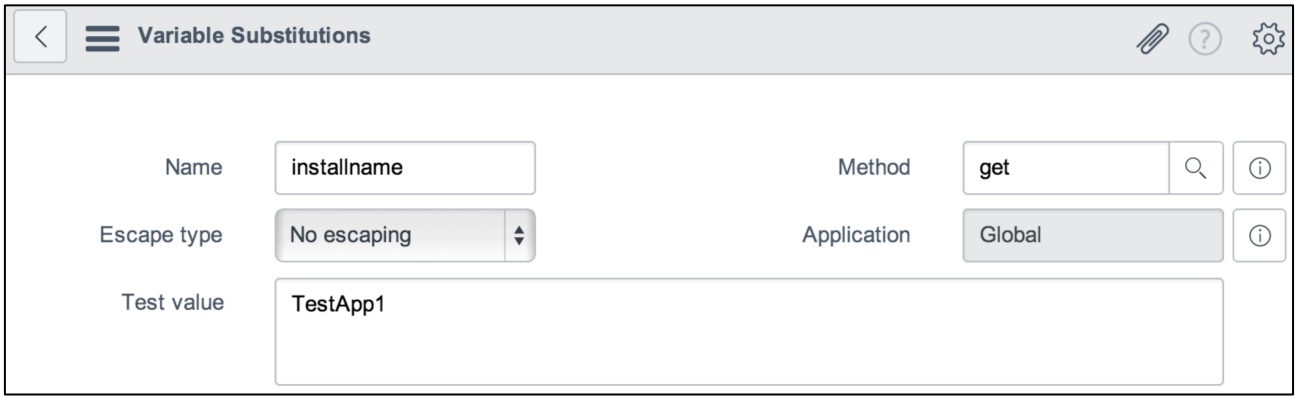
   Notes: Click the gear button  on the top right of the page and enable **Tabbed forms** button to show tab view.



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8. Enter the following:

   Name: **installname**
   Test v**alue: TestApp1**



9. Clic**k Submit.**

10. **Unde**r the **Related Links**, click **Test** UI Action.



The screen appears as in the example.



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What did we do in this exercise?

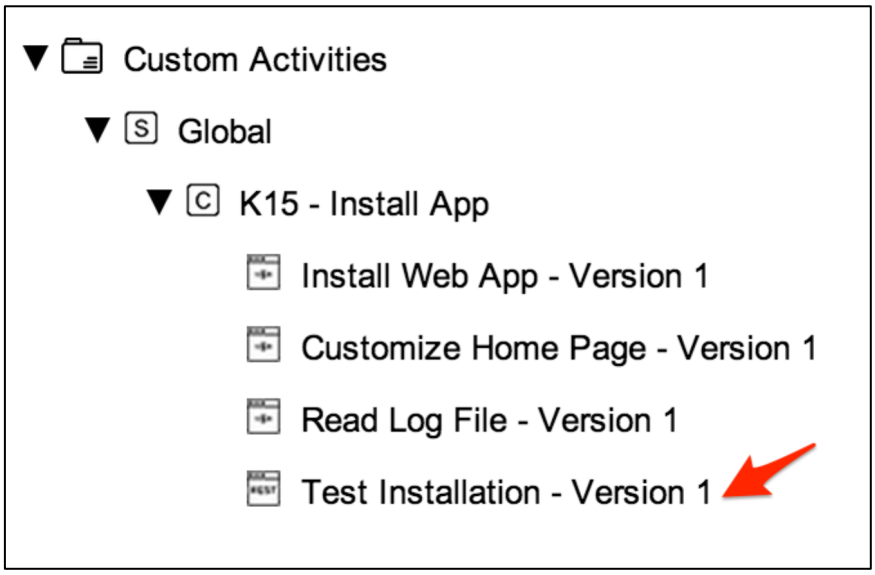
We defined a **REST** Message that uses the get method to verify there is a webpage at that endpoint. Then we executed the method to run the test. The **${installname}** is a parameter in the **Endpoint** field that is substituted with the **Value** defined for testing this REST Message.

We see that the HTTP status returned is success (200), and the **Response** looks reasonable.

Configure Custom REST Activity

Configure custom REST activity **Test Installation** to use the REST message and REST message function we just built.

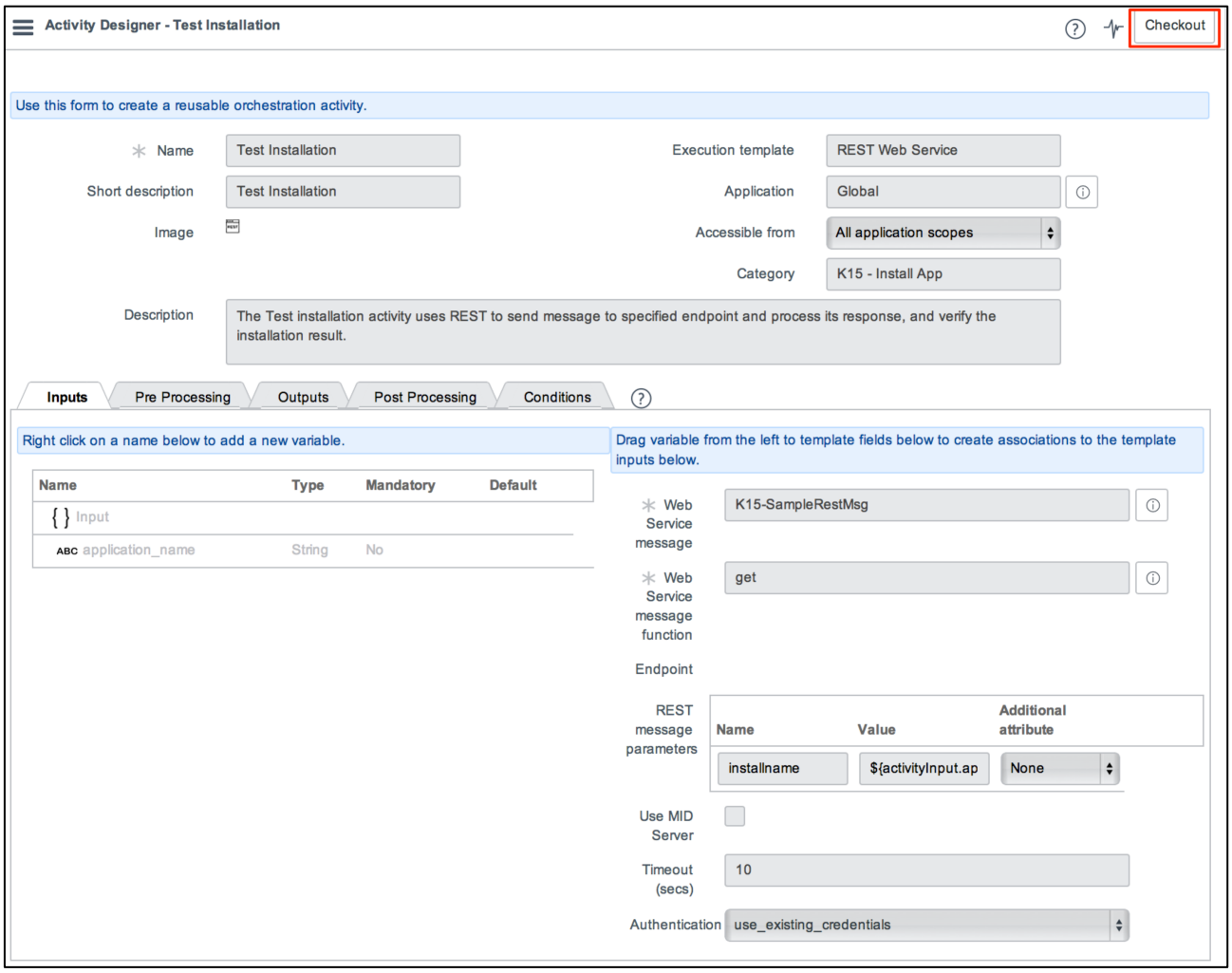
1. Return to the **Workflow Editor** and click **Custom** tab on the right side of the workflow editor.
2. Expand **Custom Activities –> Global –> K15 – Install App.**



3. **Single click** activity **Test Installation** to open the activity on workflow canvas. The activity is published and all fields are read-only. In order to update the configuration, we need to checkout the activity.

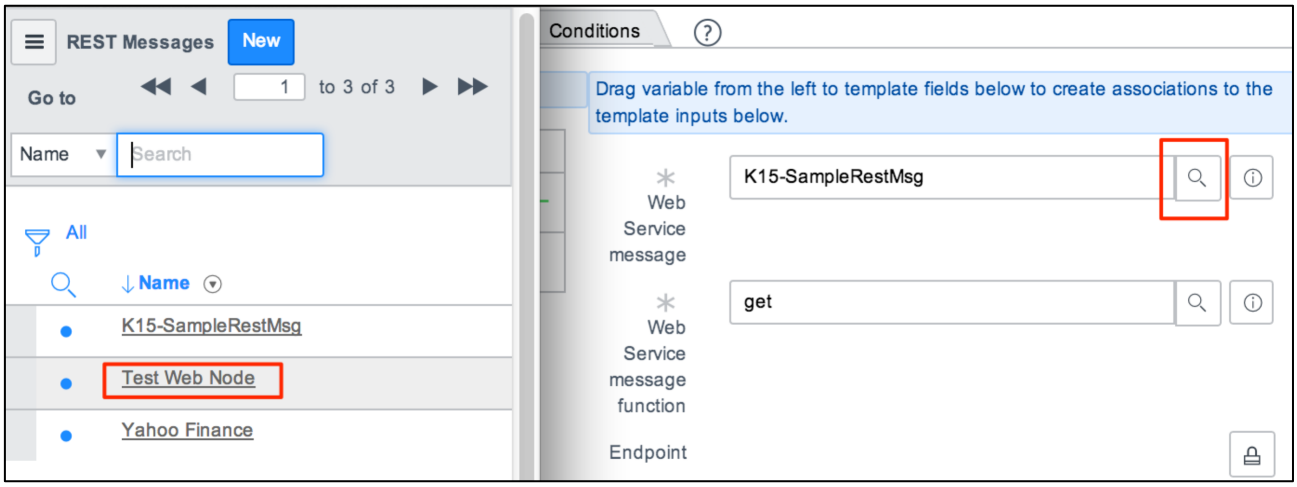
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4. Click **Checkout**.



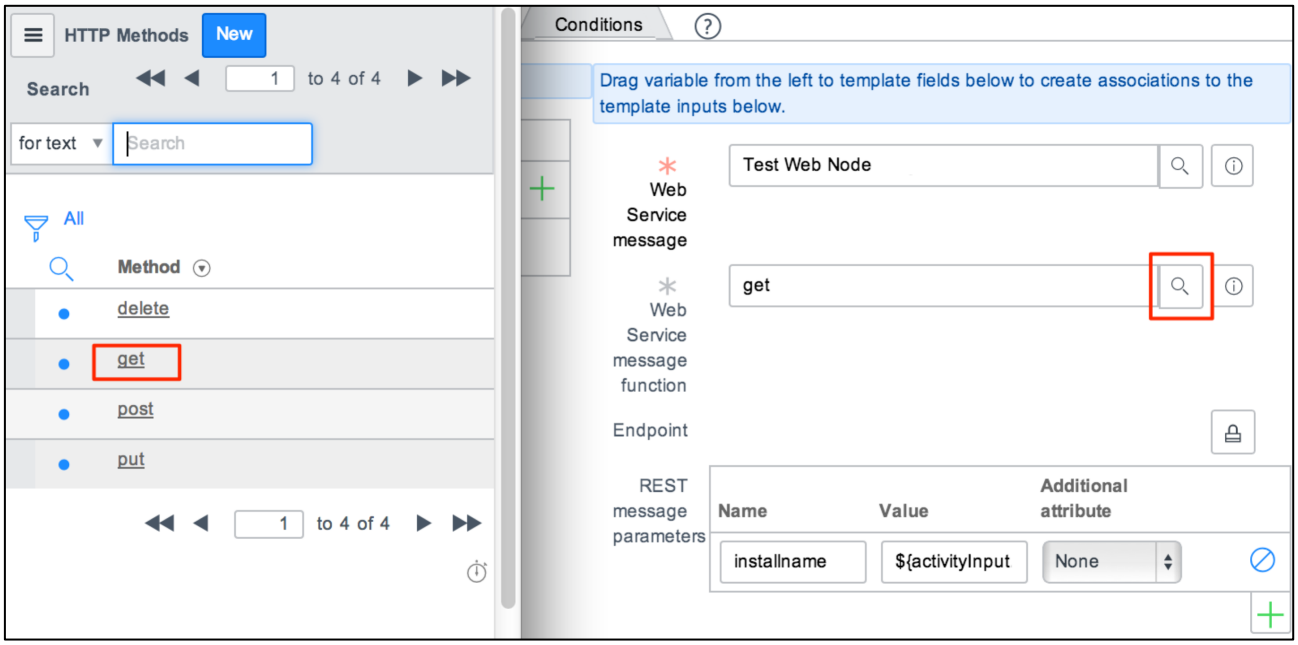
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5. Select reference lookup button next to **Web Service message** field to bring up REST Message look up. Select **Test Web Node** REST message.



6. Verify **Web Service message** is updated to **Test Web Node**.

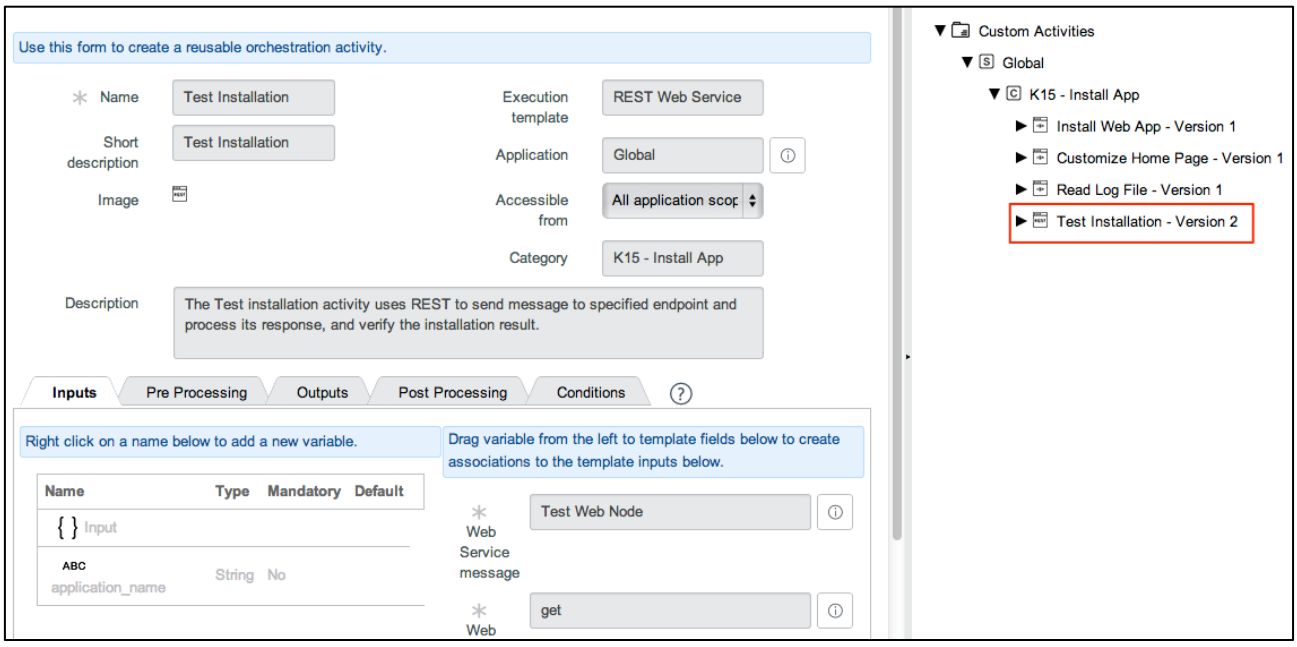
7. Select reference lookup button next to **Web Service message function** to bring up HTTP Methods look up. Select **get** function.



8. Click **Publish** to publish the updated activity.

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9. Verify the activity is published. All fields are read only. The activity version is updated to 2.

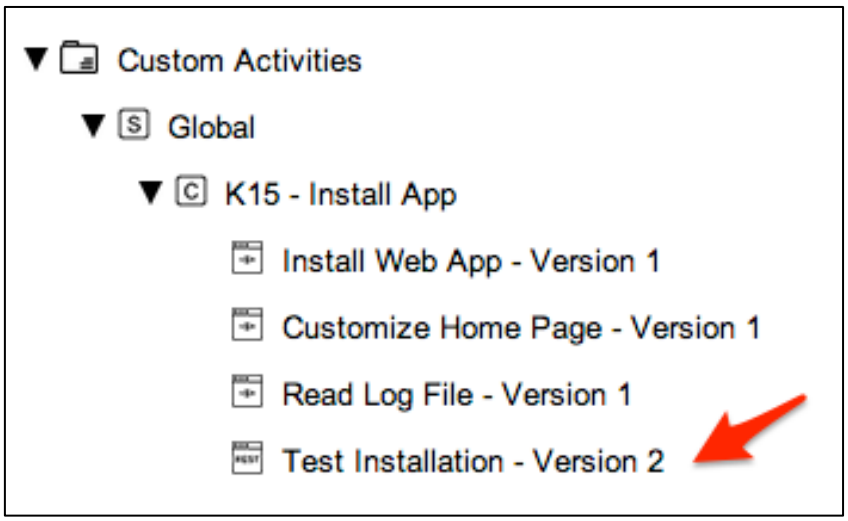


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Integrating the Verification Mechanism into the Subflow

Follow the steps below to have the subflow perform this verification automatically after the has installation succeeded.

1. Go back to the **Workflow Editor**. Open the **Install App** workflow.
2. Click **Custom** tab and expand **Custom Activities – > Global -> K15 – Install App**.



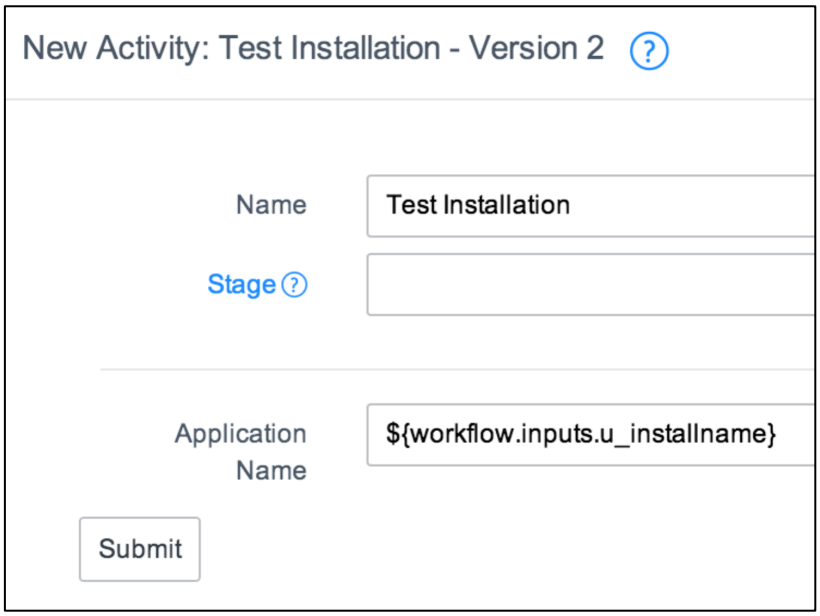
3. Drag **Test Installation** activity onto the transition between the Customize Home Page **Success** and **End**.
4. Enter the following:

   Name: **Test Installation**

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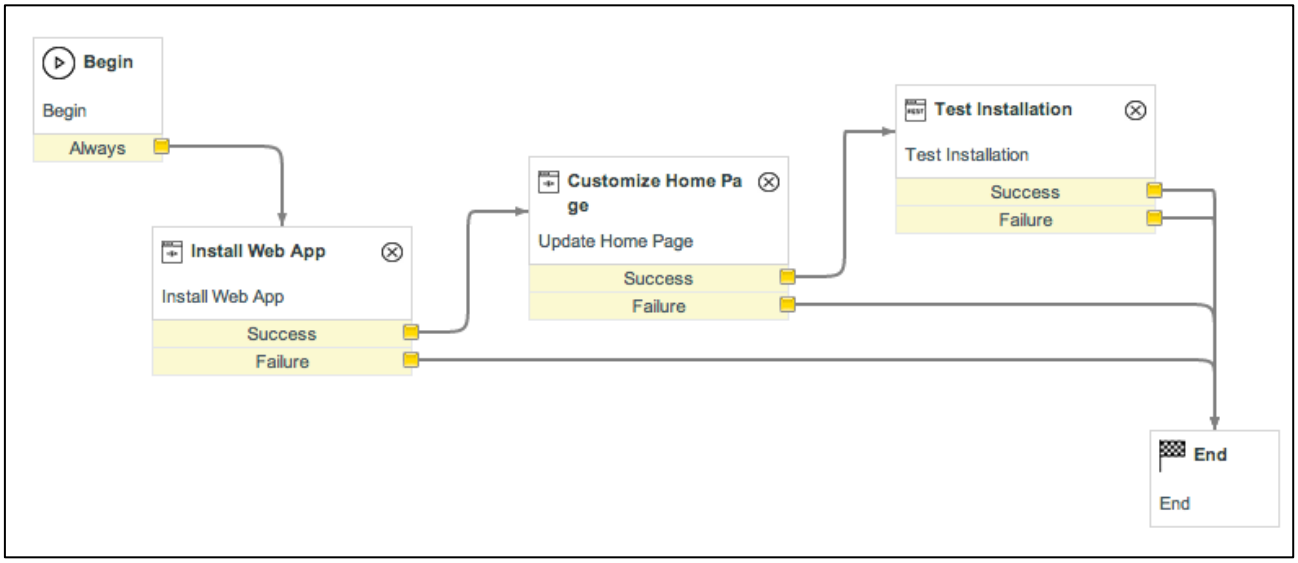
5. Drag the data from **Data** tab and drop to the following activity variable:

   Application Name: **${workflow.inputs.u_installname}**



6. Click **Submit**.

7. Create a transition from both the **Success** and **Failure** conditions of the **Test Installation** activity to **End**.

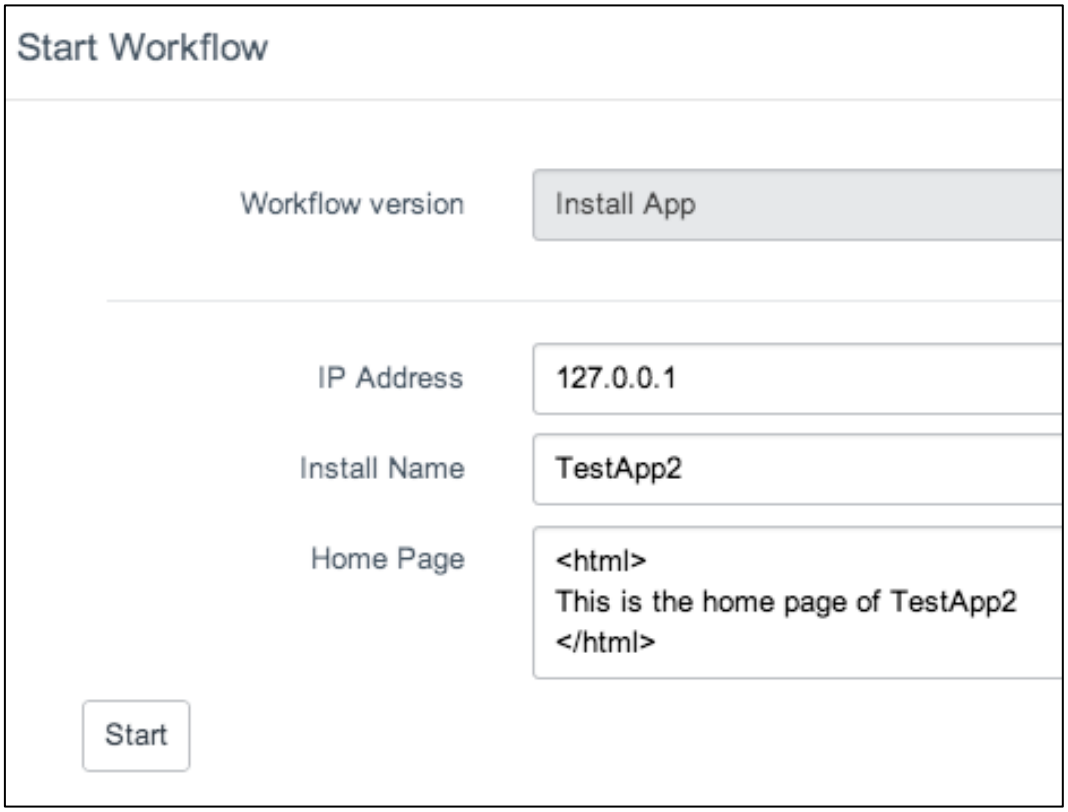


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Test the Updated Workflow

1. Click the run workflow start button  at right corner of the workflow canvas.
2. Enter the following information:

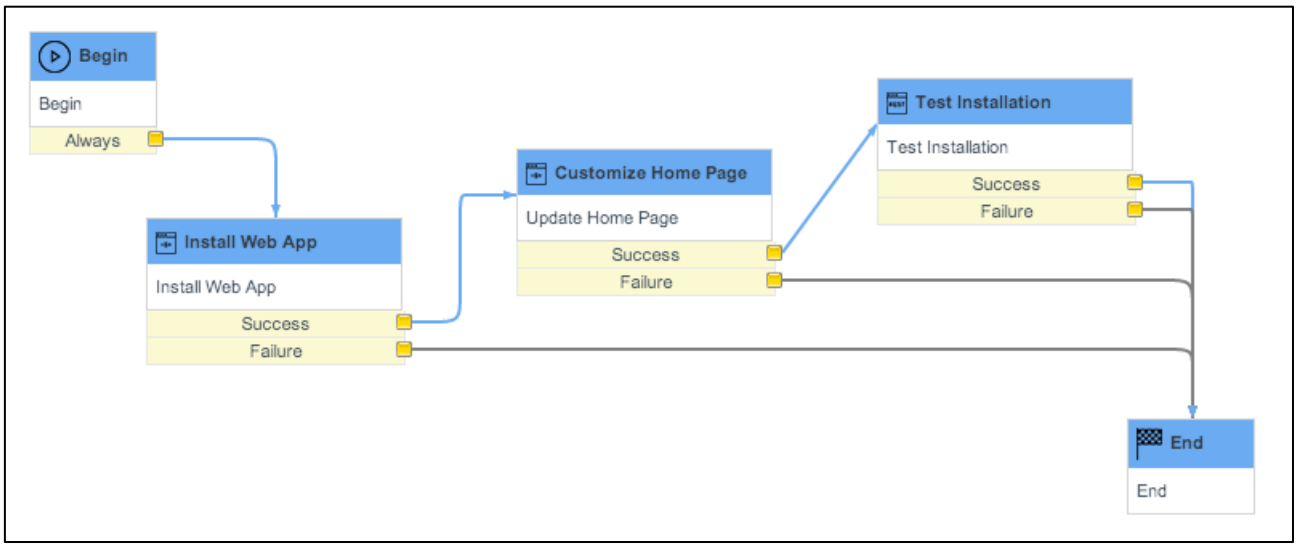
   IP Address: **127.0.0.1**
   Install Name: **TestApp2**
   Home Page: **<html>This is the home page of TestApp2</html>**



3. Click **Start**.

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4. **Refresh** until the workflow completes. It should follow success transitions to **End**.



Progress Report

1. Navigate to **Lab Management > Report Lab Progress.**
2. Click **I am done!**

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Lab Goal

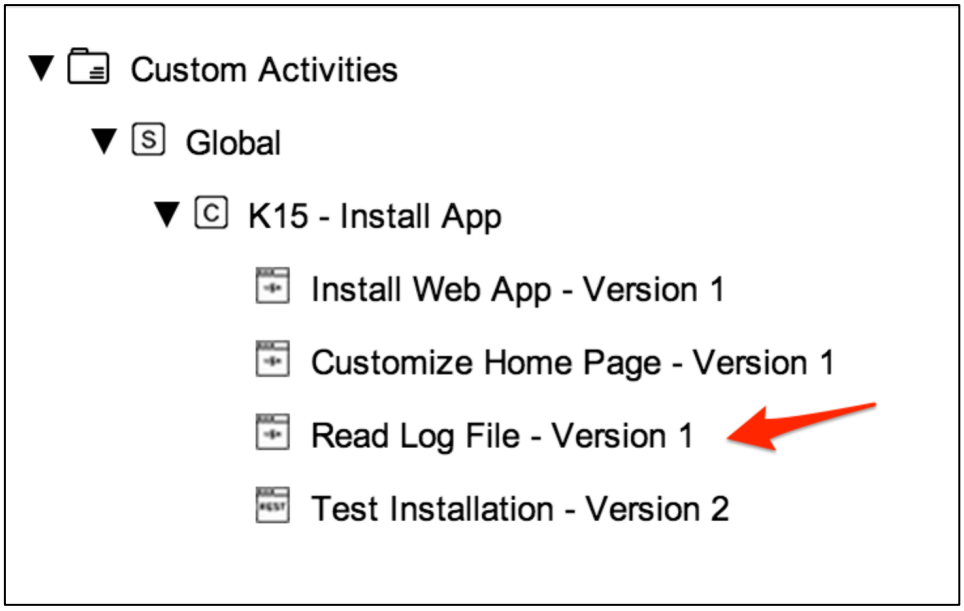
This lab explains how to handle installation failure scenario. Use File Read activity to grab the contents of log file and save the information to workflow log. Return the execution status of the subflow to the parent workflow.

Lab 3
Handle Installation Failure

Grab Contents of a Log File

If the installation fails, we would like to retrieve contents of the log file generated by the install script. How do we do that? We have an activity to do exactly that. Use it to pull the contents of the file, and write the contents of the file to the workflow log.

1. Return to the **Workflow Editor**.
2. Click **Custom** tab and expand **Custom Activities > Global > K15 – Install App**.



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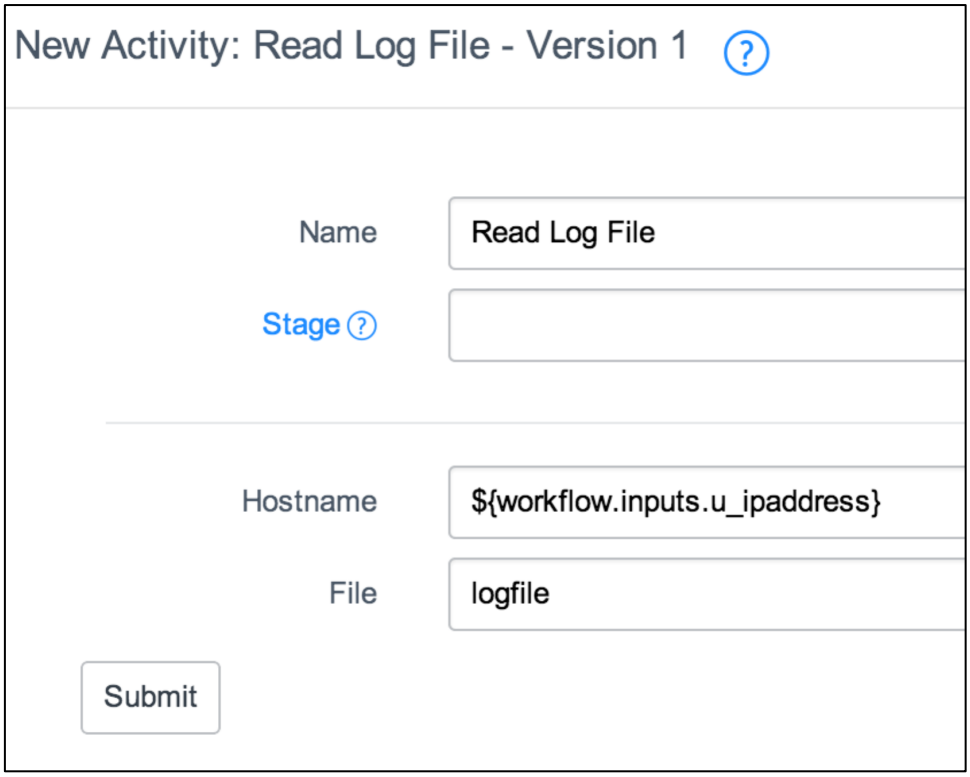
3. Drag **Read Log File** onto the transition between Install Web App's **Failure** condition and **End**.

4. Enter the following information:

   Name**: Read Log File**
   File**: logfile**

5. Drag workflow input data **IP Address** from **Data** tab and drop to the following activity variable:

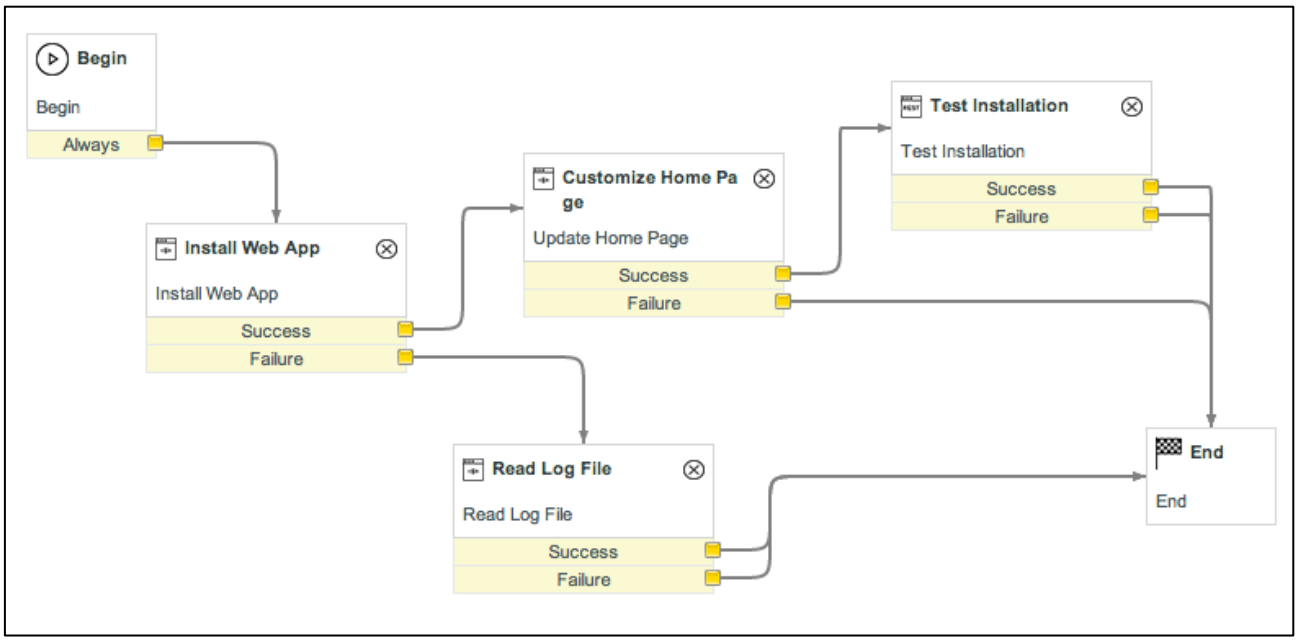
   Hostname: **${workflow.inputs.u_ipaddress}**



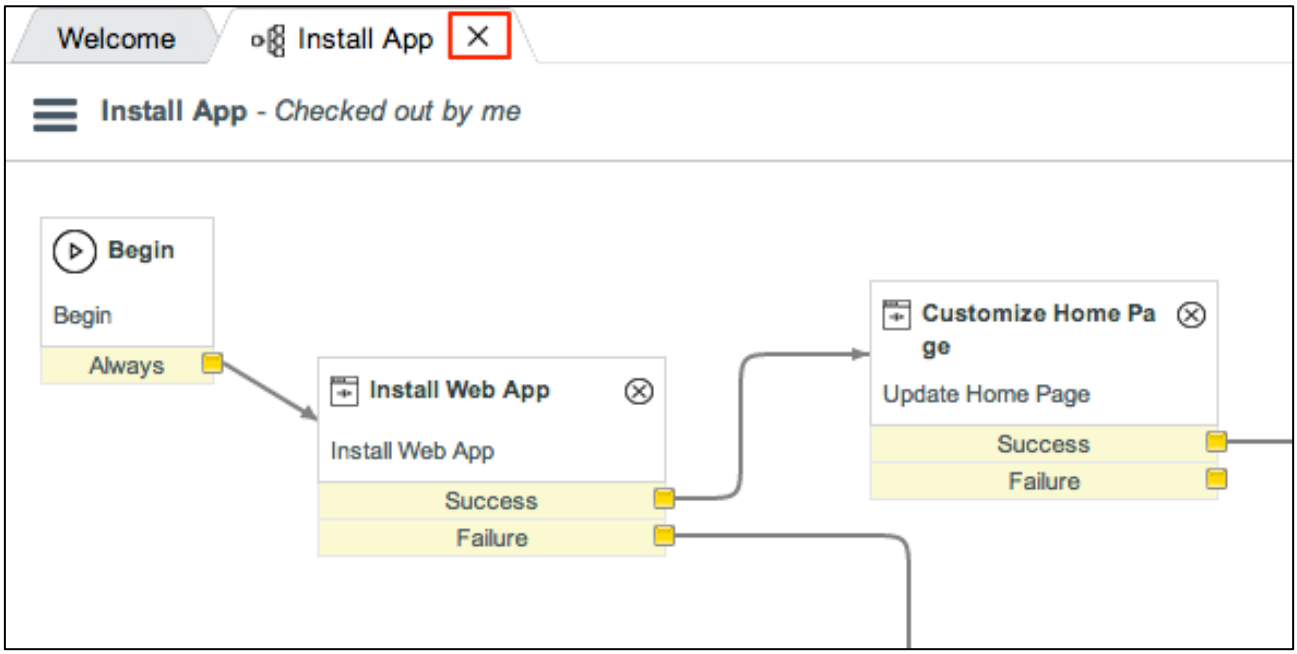
6. Click **Submit**.

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7. Create transitions from the Success and Failure conditions of the **Read Log File** activity to **End**.



8. Click **X** on the workflow "Install App" tab to close the workflow.

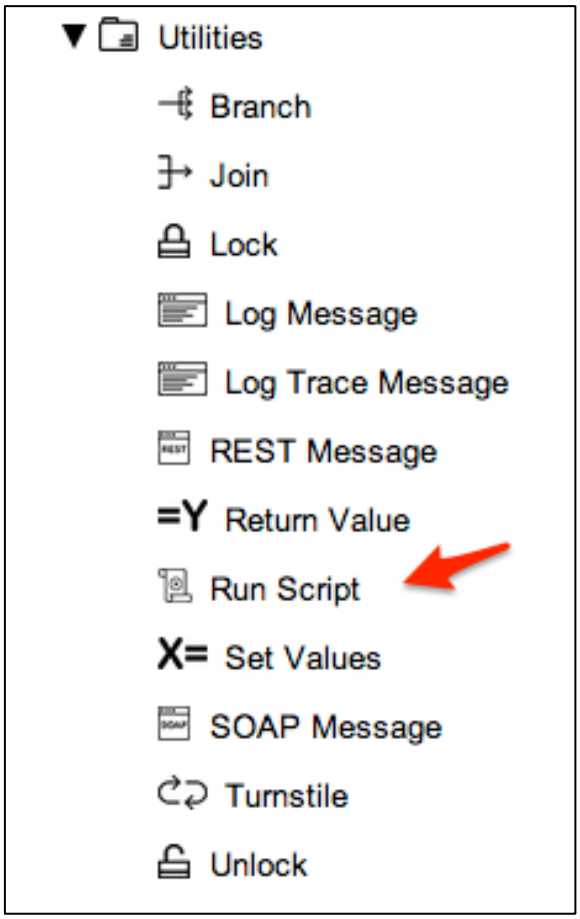


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Put Contents of a Log File in the Workflow Log

Where did the file content go? Into the output variable of the Read Log File activity. The contents of the log file are stored in activity output variable **contents**. Where can find the output of the Read Log File activity? The data is available on the databus.

1. In the **Workflow Editor**, click **Workflows** tab and click **Install App** to open the workflow.
2. Click **Core** tab and expand **Core Activities -> Utilities**.
3. Drag **Run Script** activity from the **Utilities** category onto the transition between the Read Log File's Success condition and End.

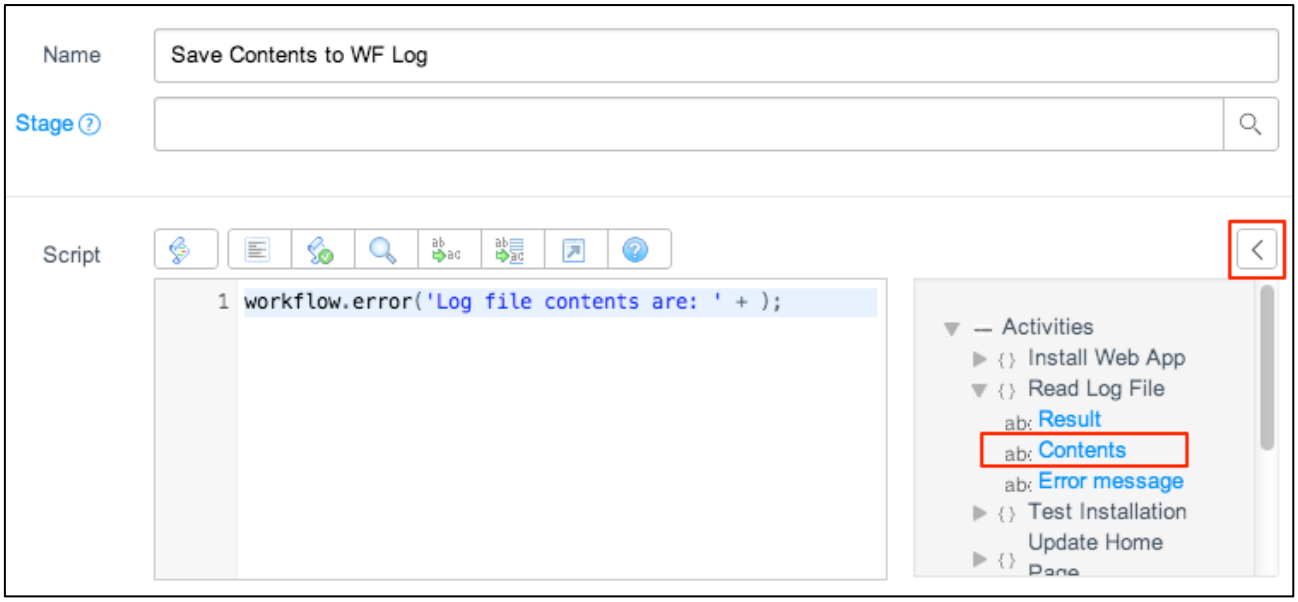


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4. Enter the following information

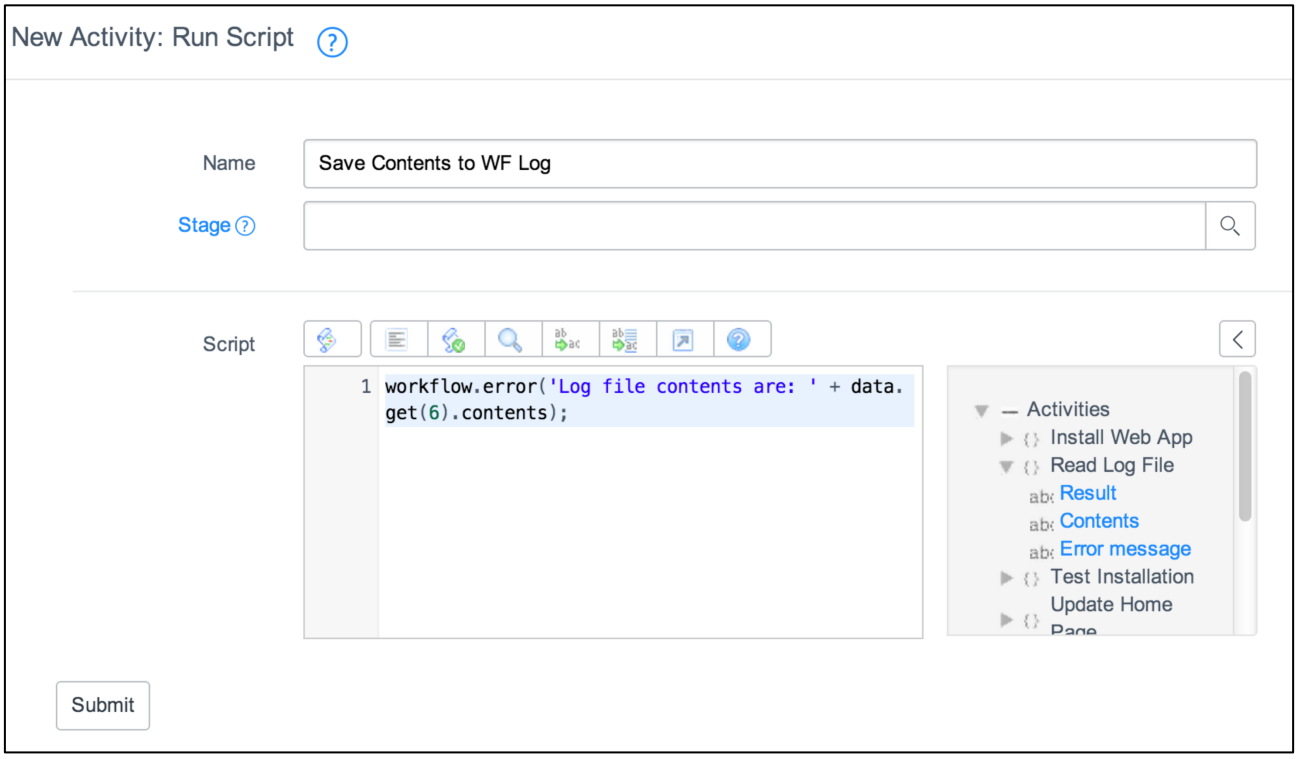
   Name: **Save Contents to WF Log**
   Script**: workflow.error('Log file contents are: ' +);**

5. Leverage the data on the databus. Click  next to Script window to open script tree. The data on the databus also available for using in script. Expand **Activities -> Read Log File**. The outputs of the activity appear.



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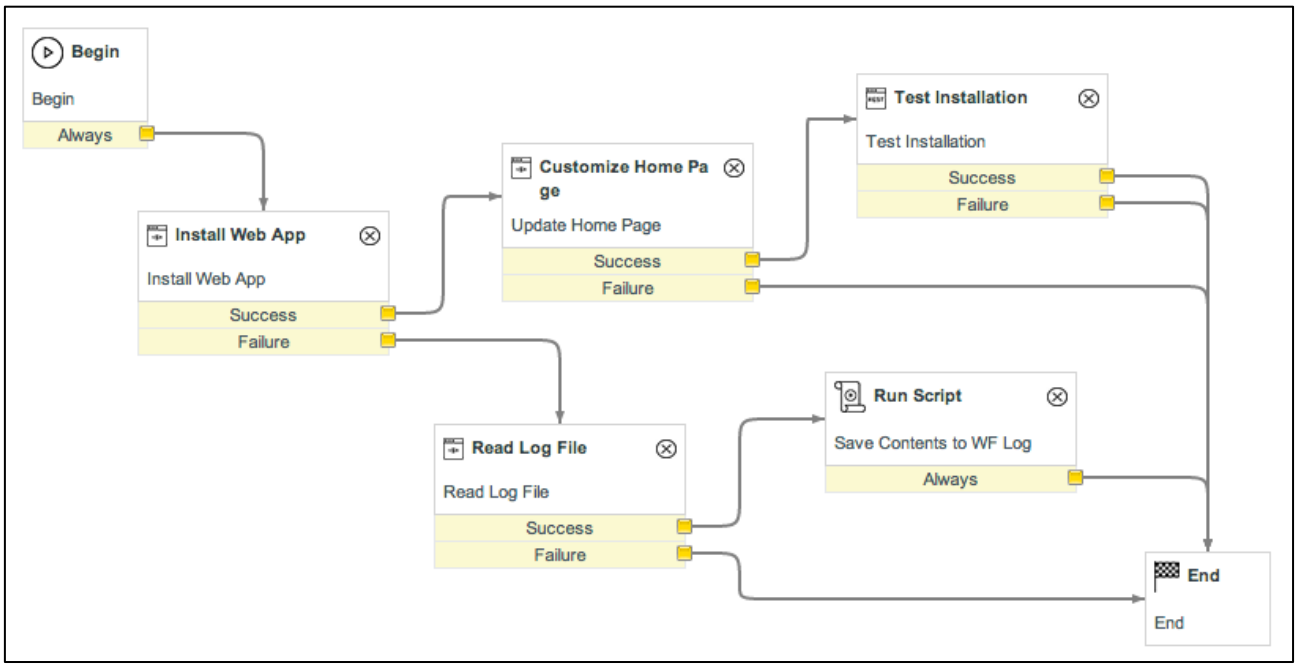
6. Click the space on Script window after **+** and before **)**. Go to script tree to click **Contents** output. The command **data.get(6).contents** is inserted at the script location you specified. Why is data.get(6)? Since the index of Read Log File activity is 6 in current workflow.



7. Click **Submit**.

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8. Confirm that the workflow is connected and appears as shown.



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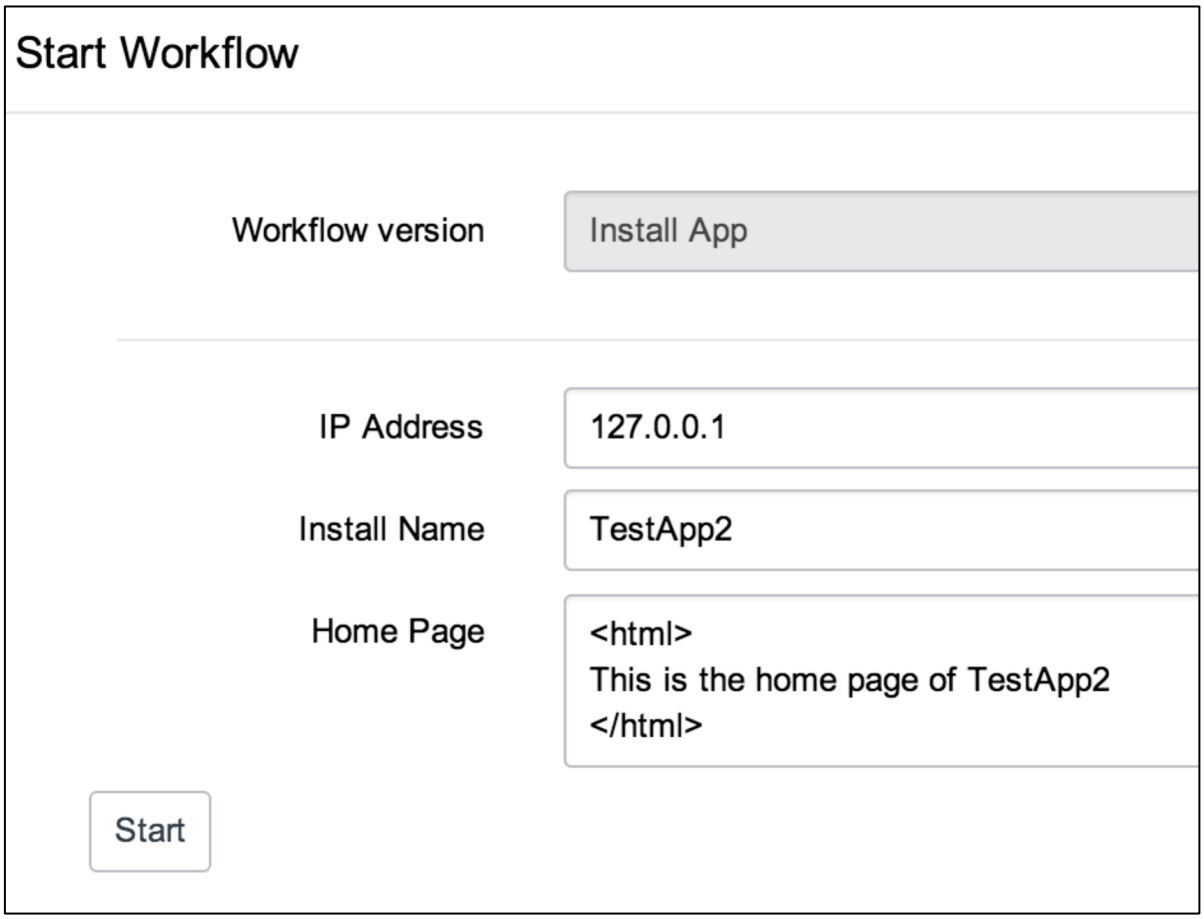
Test Updated Workflow (make it fail!)

In this exercise, enter an install name already entered, and expect a failure.

1. Click the run workflow start button  at right corner of the workflow canvas.

2. Enter the following information:

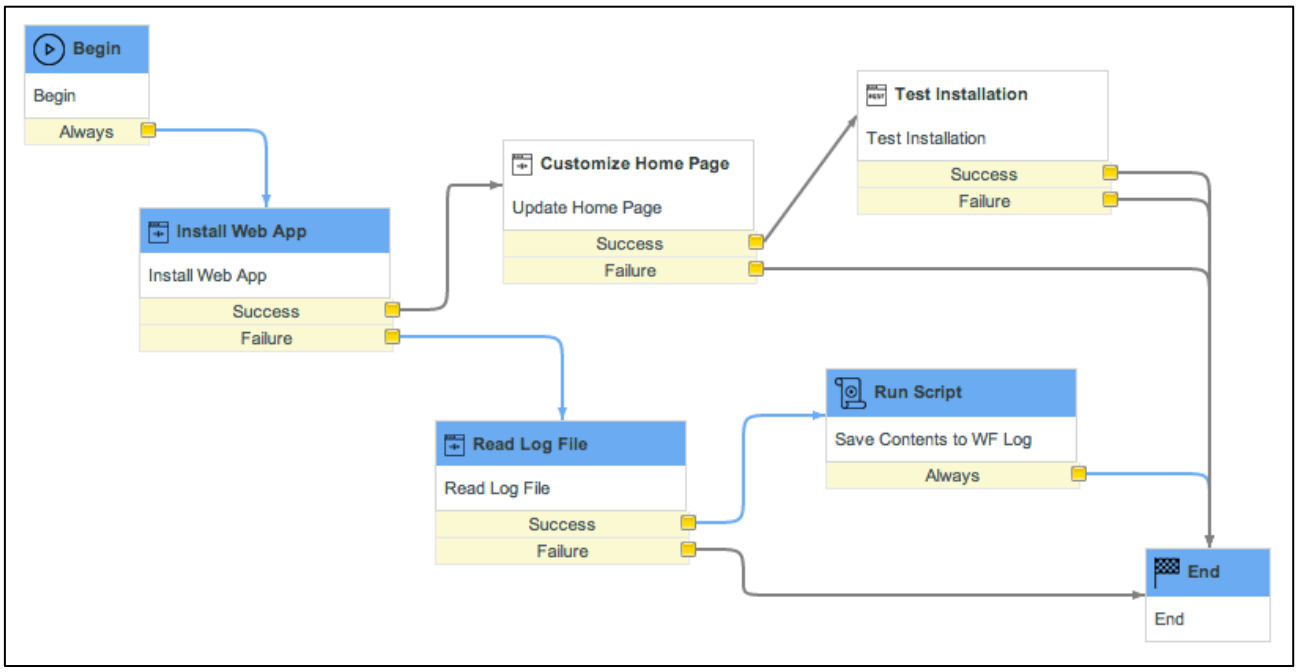
   IP Address: **127.0.0.1**
   Install Name**: TestApp2**
   Home Page: **<html>This is the home page of TestApp2</html>**



3. **Click Start.**

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4. **Refre**sh periodically until the workflow completes.



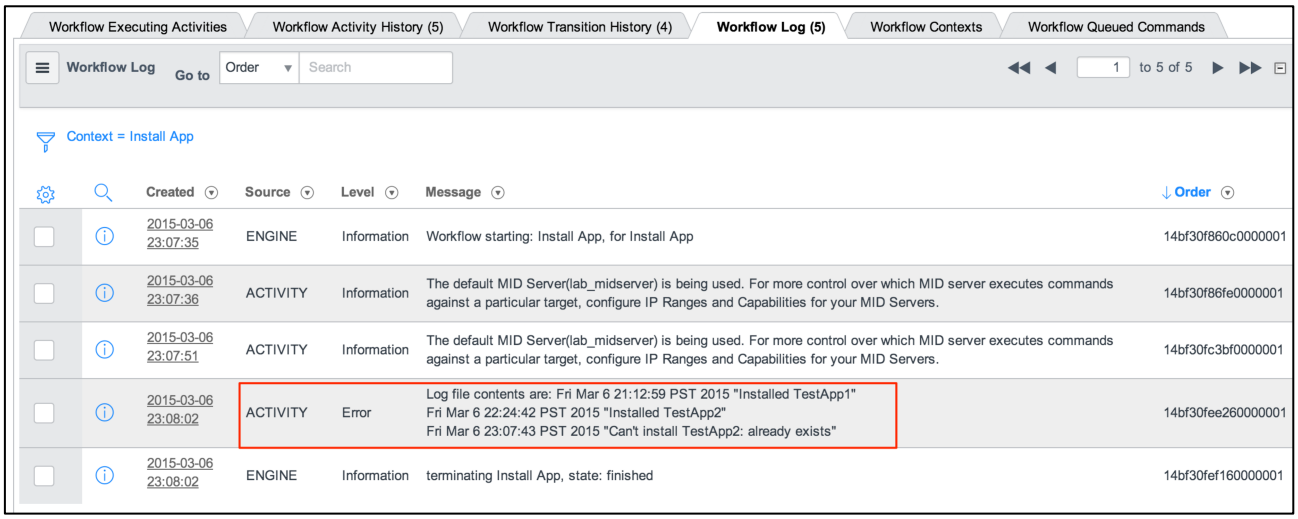
The Install Web App activity should fail; the Read Log File activity should succeed.

5. Examine the workflow context. Navigate to **Workflow > All Contexts** and open the most recent record.

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6. Look at the **Workflow Log** related list.

   The contents of the log file are written in the log.



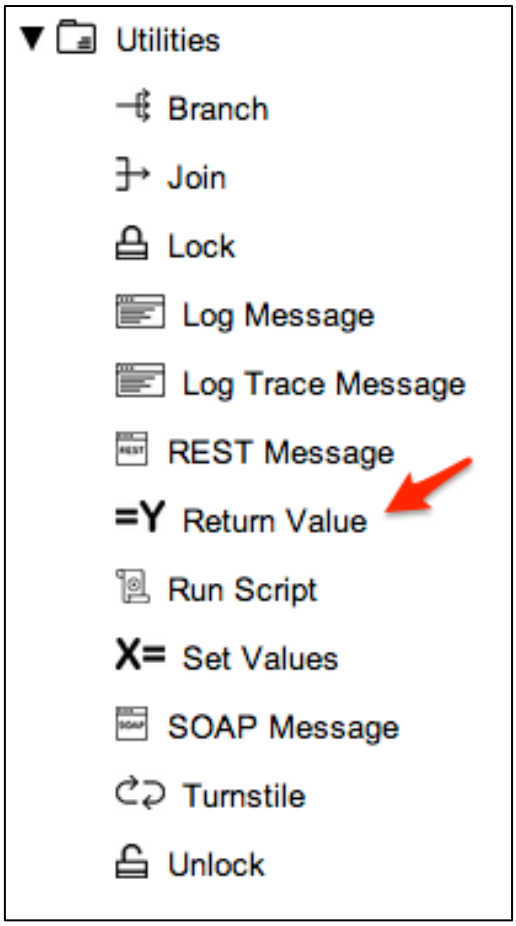
This is an error level message because we used **workflow.error** in the Run Script activity.
There is also a **workflow.info** to log info-level messages.
There is a **workflow.warn** to log warning-level messages.
There is a **workflow.debug** to log debug-level messages.
Logging messages of these levels are controlled by properties that can be configured by navigating to **Workflow > Properties**.

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Tell the Parent Workflow What Happened

So far, the workflow is appropriate as a standalone workflow; however, to embed this as a subflow within a parent workflow, use the process below. The parent workflow wants the subflow's status. For simplicity, return the string **success** when it works, and **failure** when it does not.

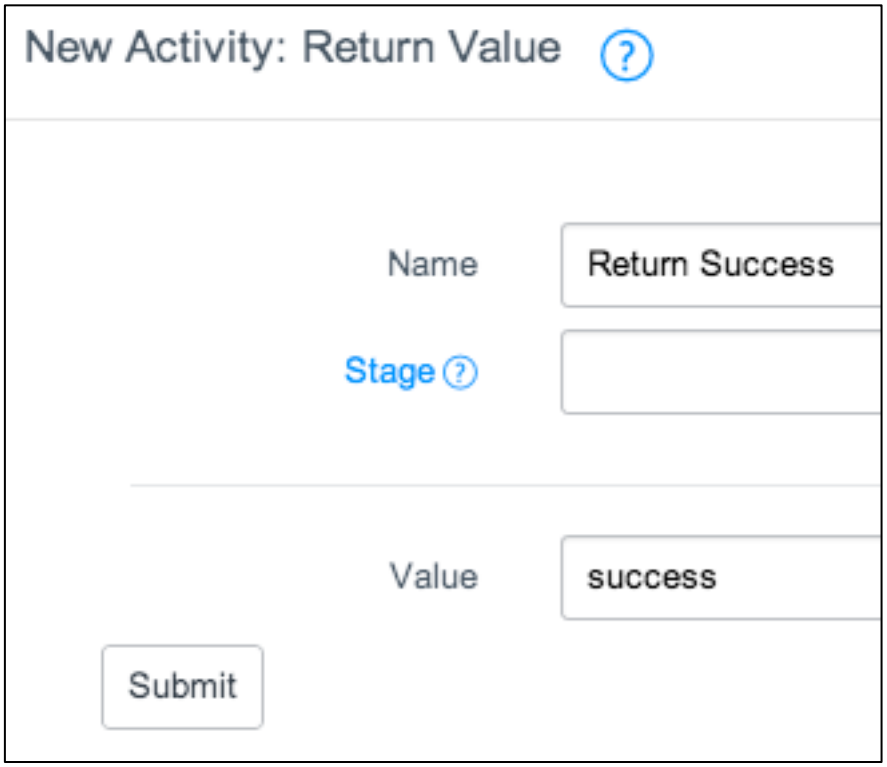
1. In the workflow editor, click **Core** tab and expand **Core Activities > Utilities.**
2. Drag **Return Value** activity from the **Utilities** category onto the canvas.



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3. Enter the following:

   Name: **Return Success**
   Value: **success**

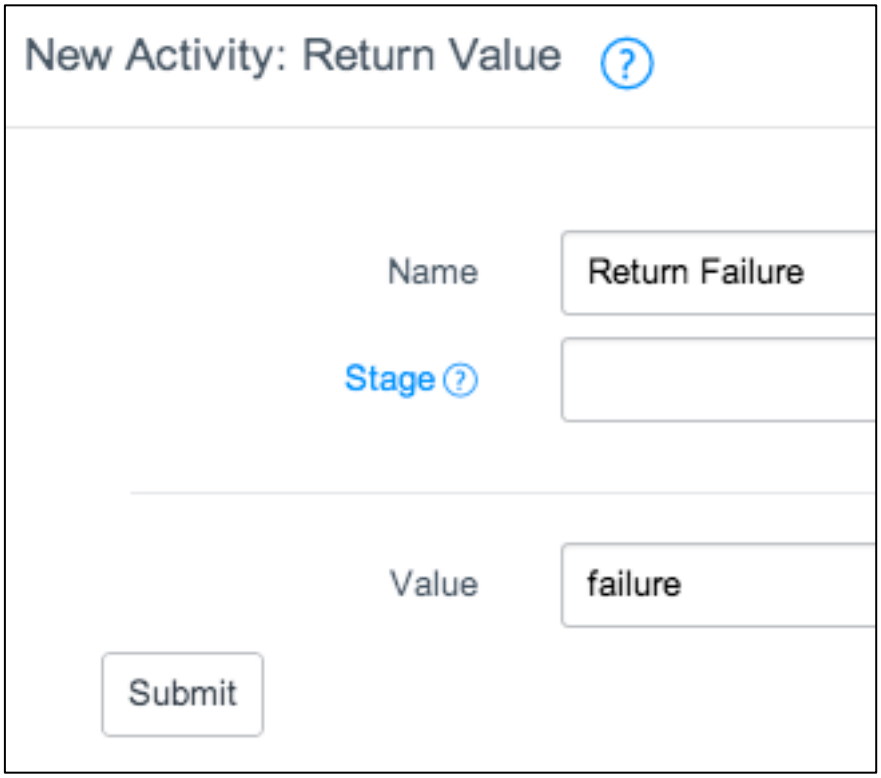


4. **C**lick **Submit.**

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5. Repeat step 1 through 3, enter the following information in the Application form:

   Name: **Return Failure**
   Value: **failure**

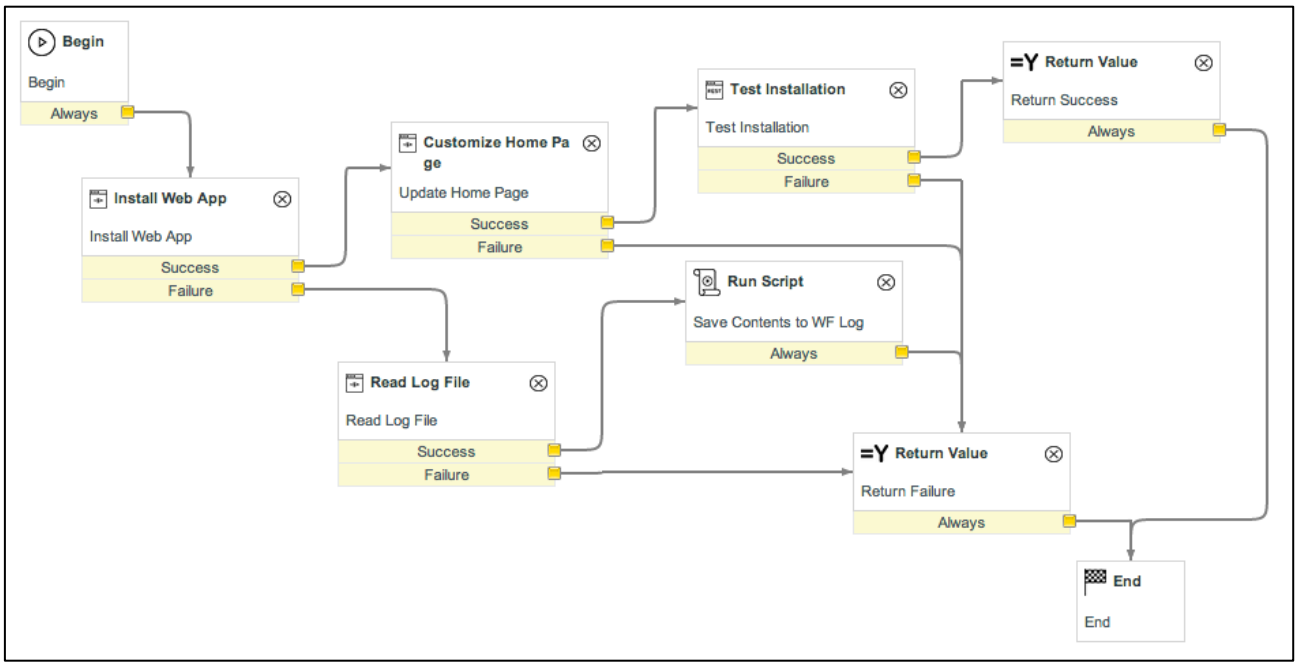


6. Update the transitions as follows:

   From **Test Installation Success** update transition to **Return Value Success**.
   From **Test Installation Failure** update transition to **Return Value Failure**.
   From **Customize Home Page Failure** update transition to **Return Value Failure**.
   From **Read Log File Failure** update transition to **Return Value Failure**.
   From **Run Script Always** update transition to **Return Value Failure**.
   From **Return Value Success Always** update transition to **End**.
   From **Return Value Failure Always** update transition to **End**.

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7. Confirm that the workflow is connected and appears as shown.

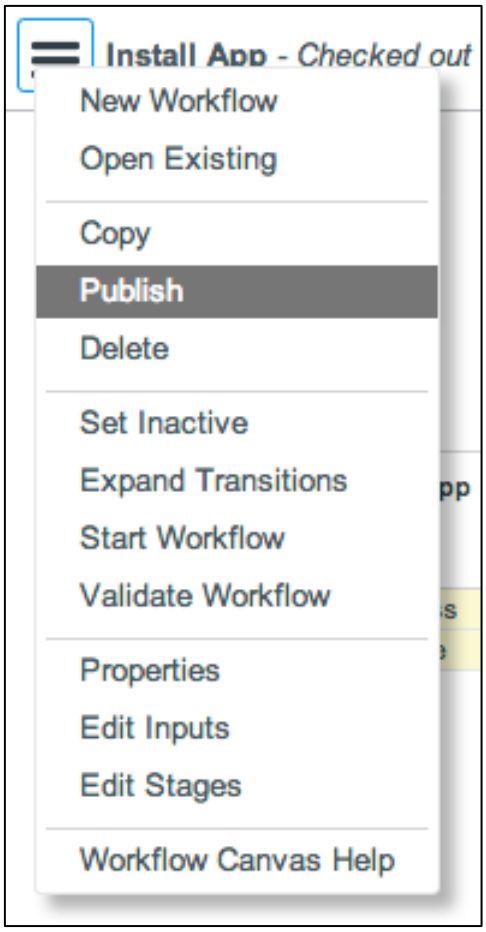


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Publish the Workflow

The subflow should be published before it can be used in the parent workflow. To publish the workflow:

1. Click the hamburger menu and select Publish.



Progress Report

1. Navigate to **Lab Management**> **Report Lab Progress.**
2. Click **I am done!**

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Lab Goal

This lab explains how to integrate the subflow to the parent workflow to replace manual tasks and test the entire workflow from begin to end.

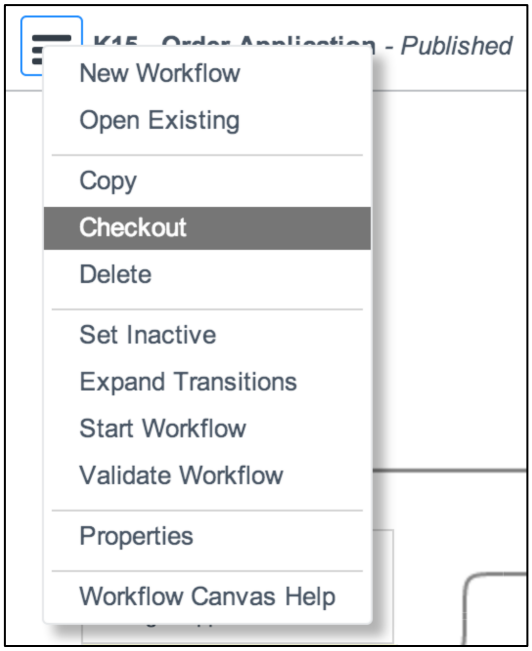
Lab 4 Integrate Subflow to Parent Workflow

Replace Manual Tasks in Parent Workflow with Subflow

Your instance has a prebuilt workflow that contains approvals, license checks, and manual tasks to install the application. We looked at this workflow earlier. This is the parent workflow for the subflow we have built. Now, integrate the subflow into the parent workflow, replacing the manual tasks.

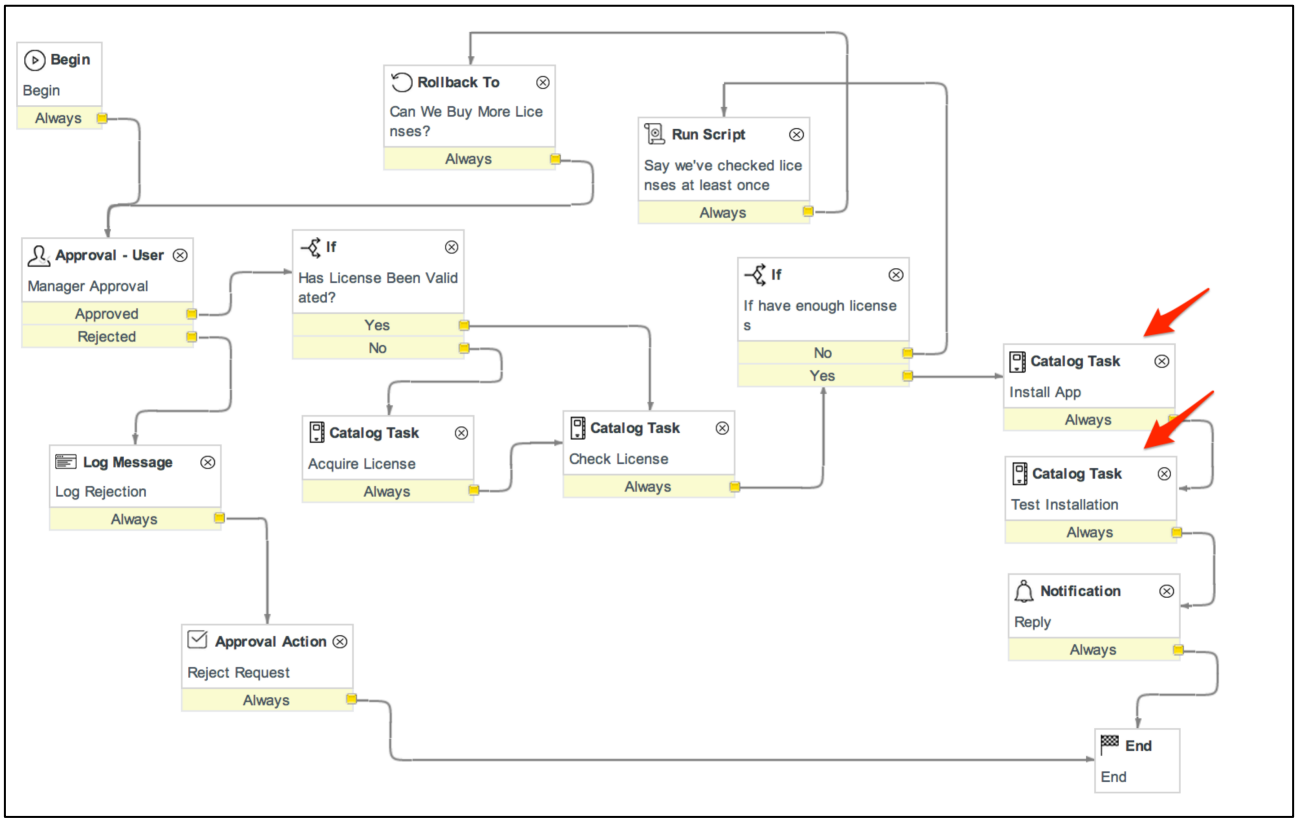
1. In the **Workflow Editor**, click **Workflows** tab and click **K15 - Order Application** to open the workflow.

2. **Checkout** the **K15 - Order Application** workflow.



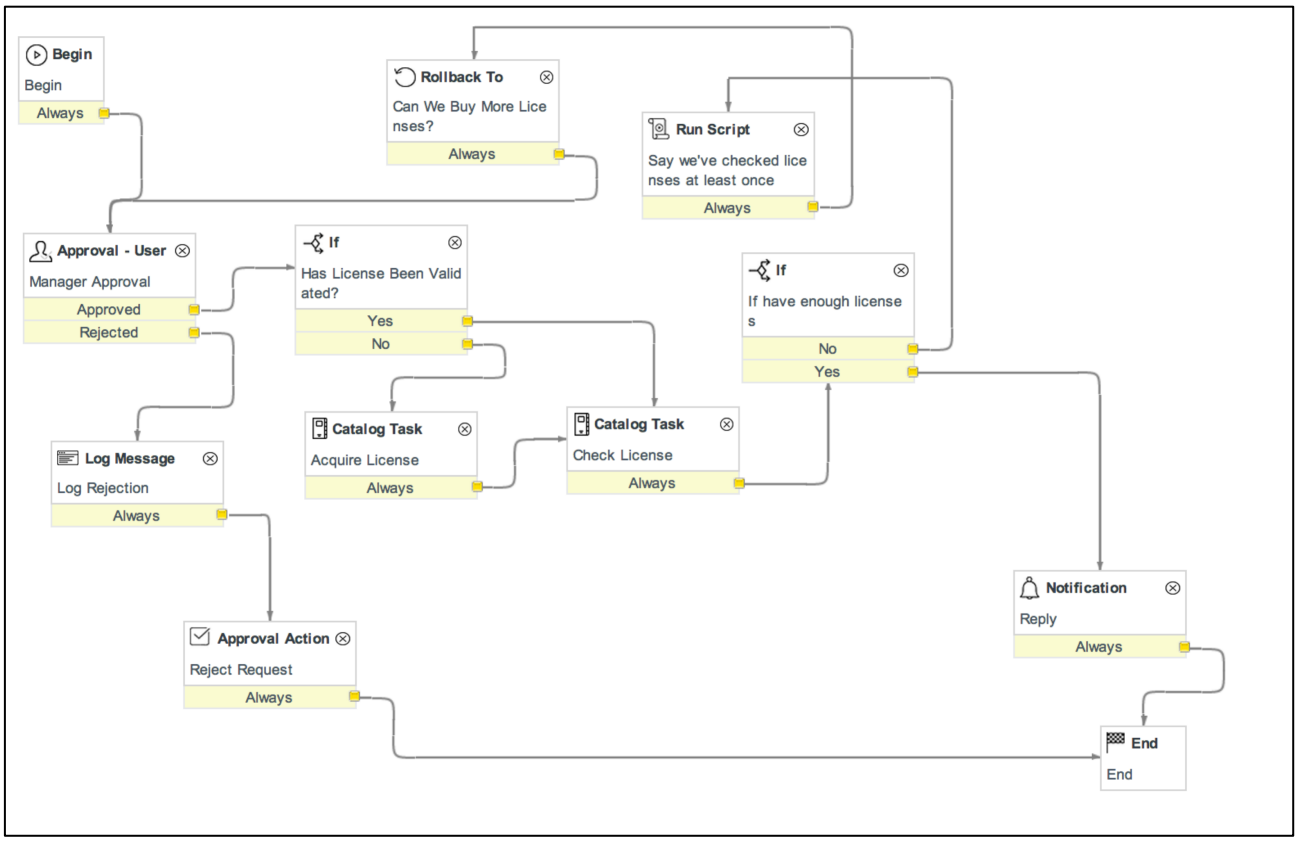
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3. Delete **Install App** and **Test Installation** Catalog Tasks by clicking **X** on Catalog Task activity. We replace these two manual tasks by the Install App workflow just created.



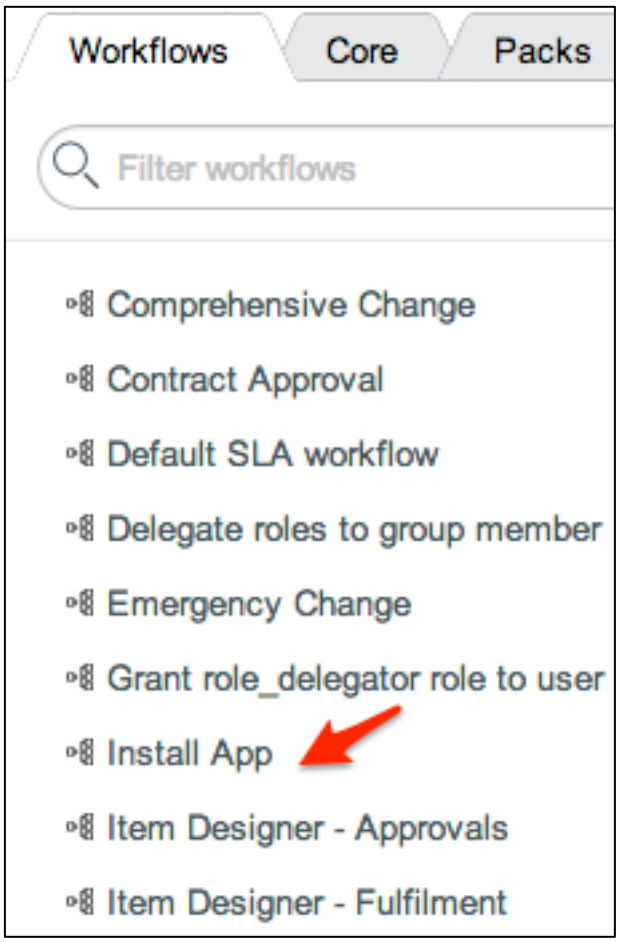
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4. Confirm that the workflow appears as shown after deleting the two Catalog Tasks.



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5. Click the **Workflows** tab on the right side of the Workflow Editor. This shows all workflows in the system. You can drop a workflow into your current workflow as a subflow by treating one of these workflows in the list as an activity.



6. Drag the **Install App** workflow onto workflow canvas.

7. Enter the following:

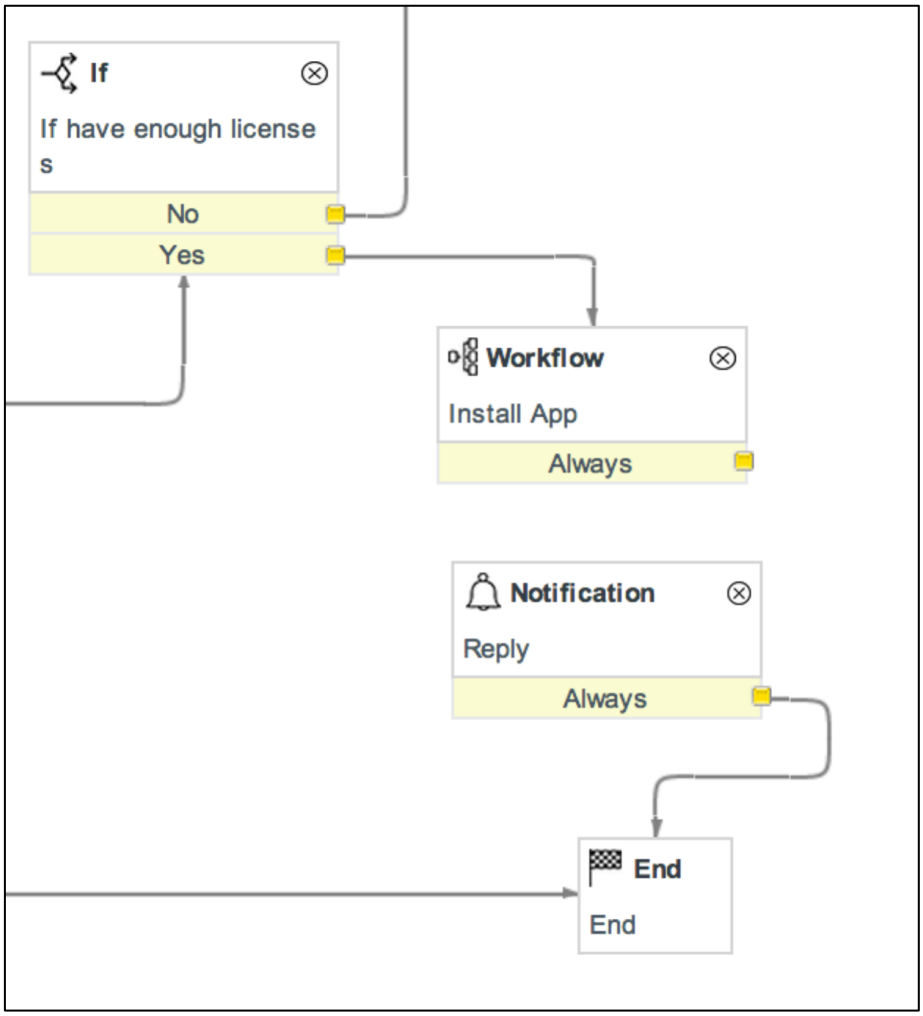
   Map return value to: **workflow.scratchpad.result**
   IP Address: **${current.variables.target_server.ip_address}**
   Install Name: **${current.variables.appname}**
   Home page: **${current.variables.home_page.web_page}**

8. Click **Submit**.

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9. Create a transition from **Yes** in **If** to the new **Workflow** activity.

10. Confirm that this part of the workflow appears as shown.

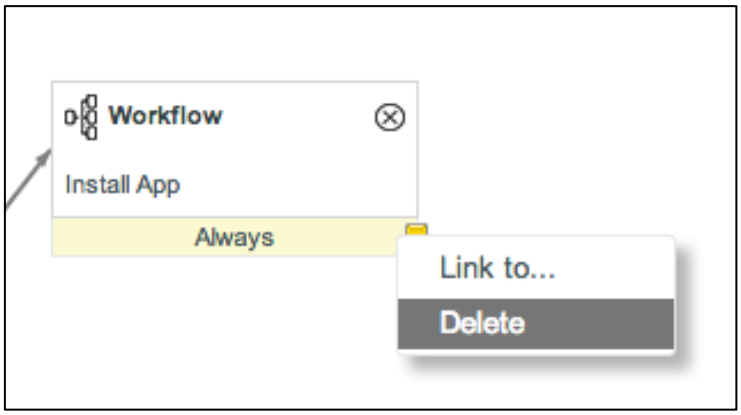


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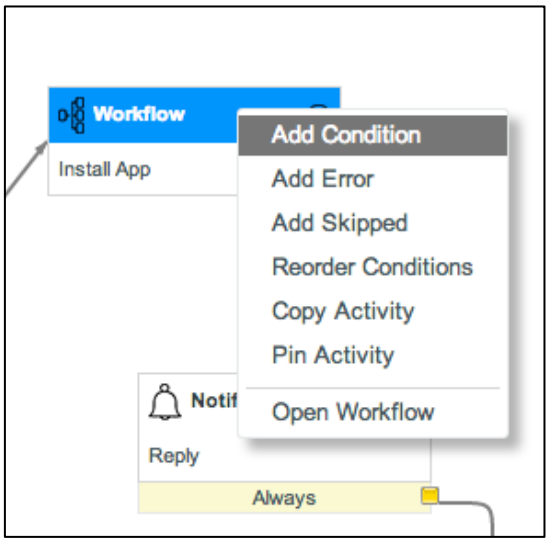
Check Subflow Results

This workflow currently always sends a notification to the requesting user after the subflow is called, regardless of whether the installation succeeded or failed. The subflow we created returns success or failure. We should check that value and, on success, proceed to notify the user that the application has been successfully installed. On failure, we want to assign a task to someone to investigate and fix the problem before sending the notification of Success. Modify the workflow to do this.

1. Right- click on the **Always** condition of the Workflow (subflow) activity.
2. Click **Delete** on the context menu that appears.



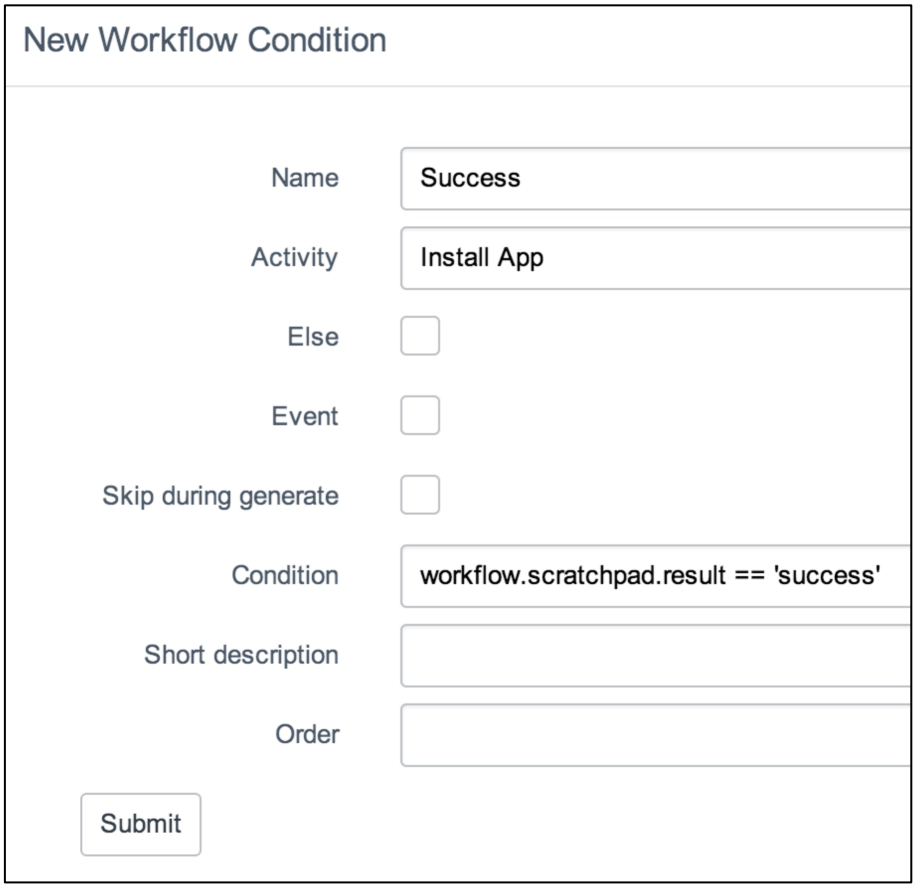
3. Right-click on the body of the Workflow activity.
4. Select **Add Condition**.



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5. Enter the following:

   Name: **Success**
   Condit**ion: workflow.scratchpad.result == 'success'**

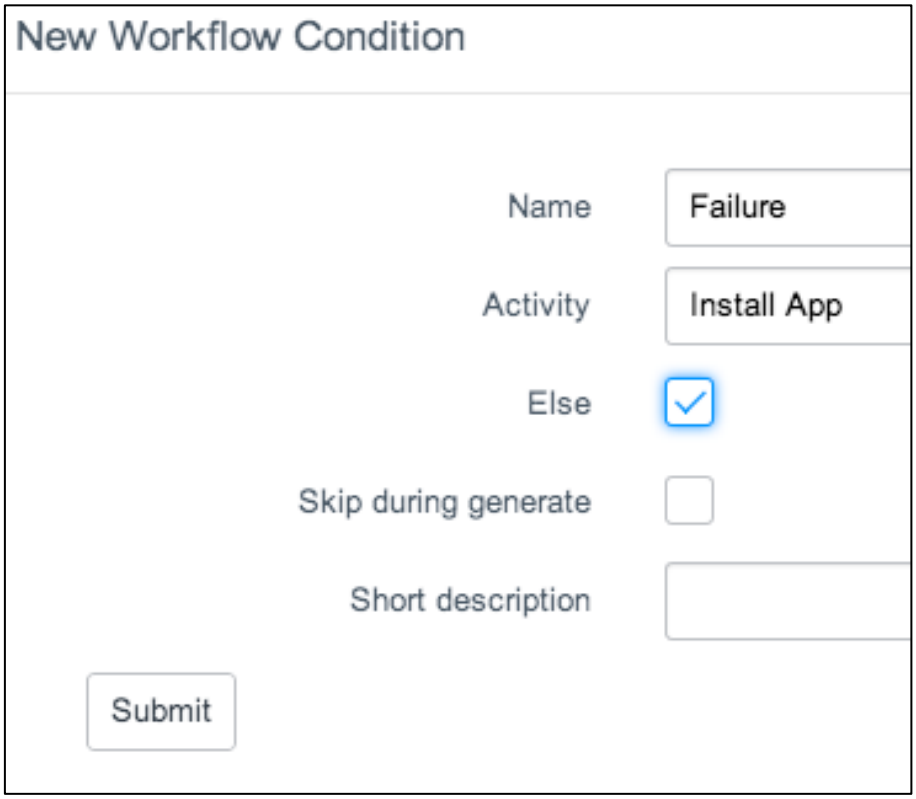


6. **Click Submit**.

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7. Repeat Steps 3-6, entering the following:

   Name: **Failure**
   Check **the Else** box

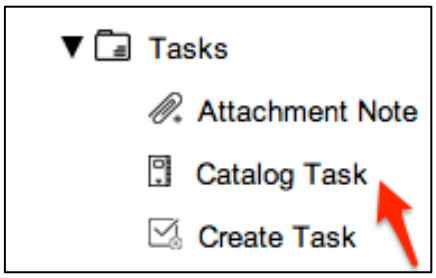


8. C**reat**e a transition from the **Success** condition on the **Workflow** activity to the **Notification** activity.

9. Add the **Catalog Task** activity on failure. Start by clicking **Core** tab and expanding the **Tasks** category on the right side of the workflow canvas.

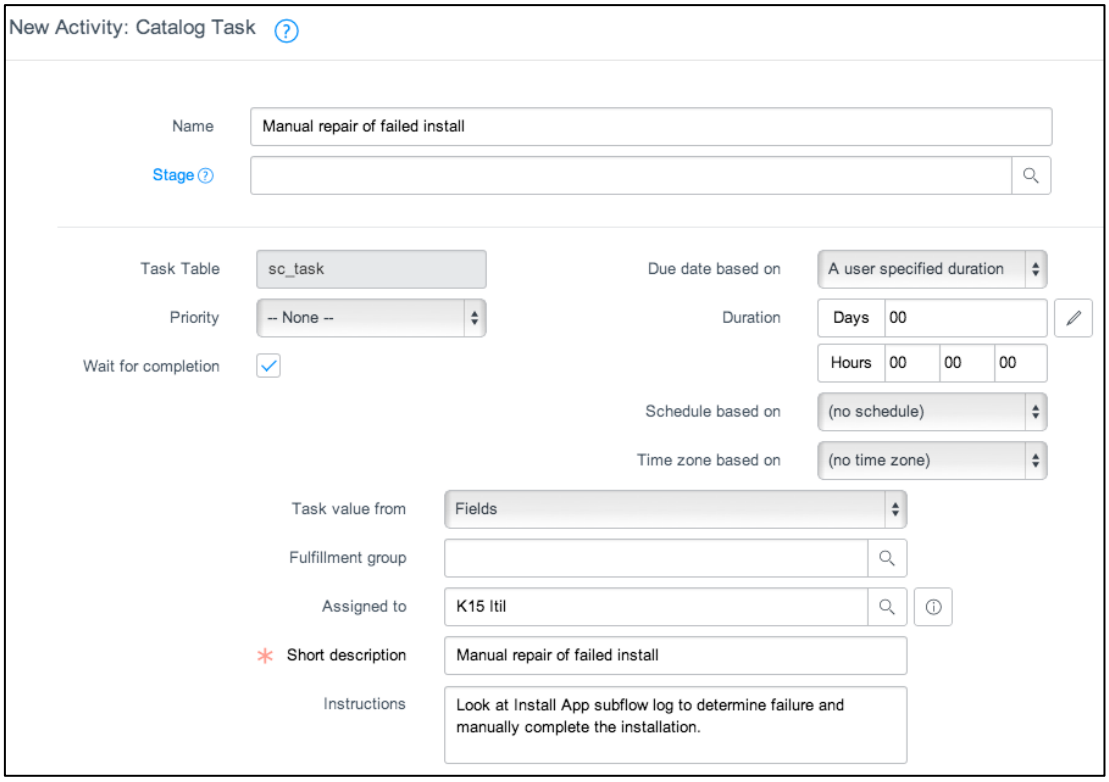
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10. Drag a **Catalog Task** onto the canvas.



11. Enter the following:

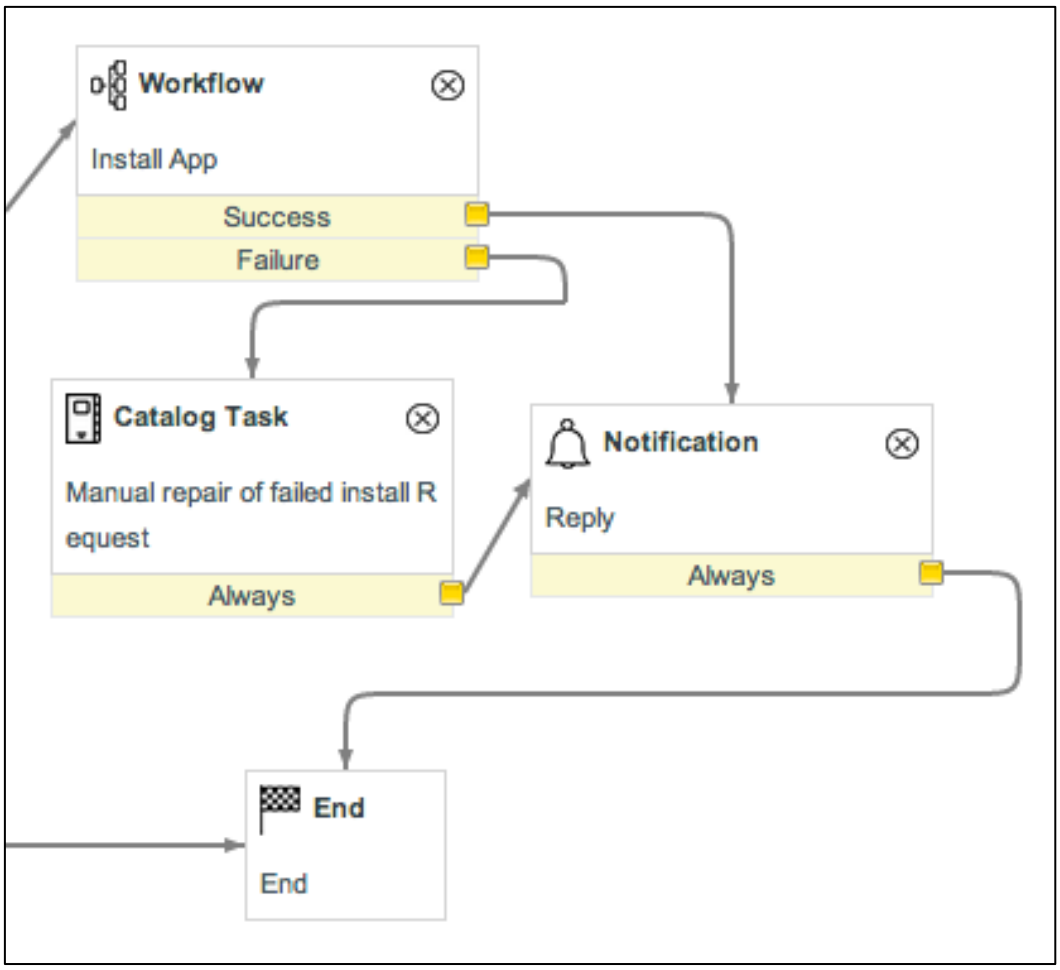
    Name: **Manual repair of failed install Request**
    Assigned to: **K15 Itil**
    Short description: **Manual repair of failed install**
    Instructions: **Look at Install App subflow log to determine failure and manually complete the installation.**



12. Click **Submit.**

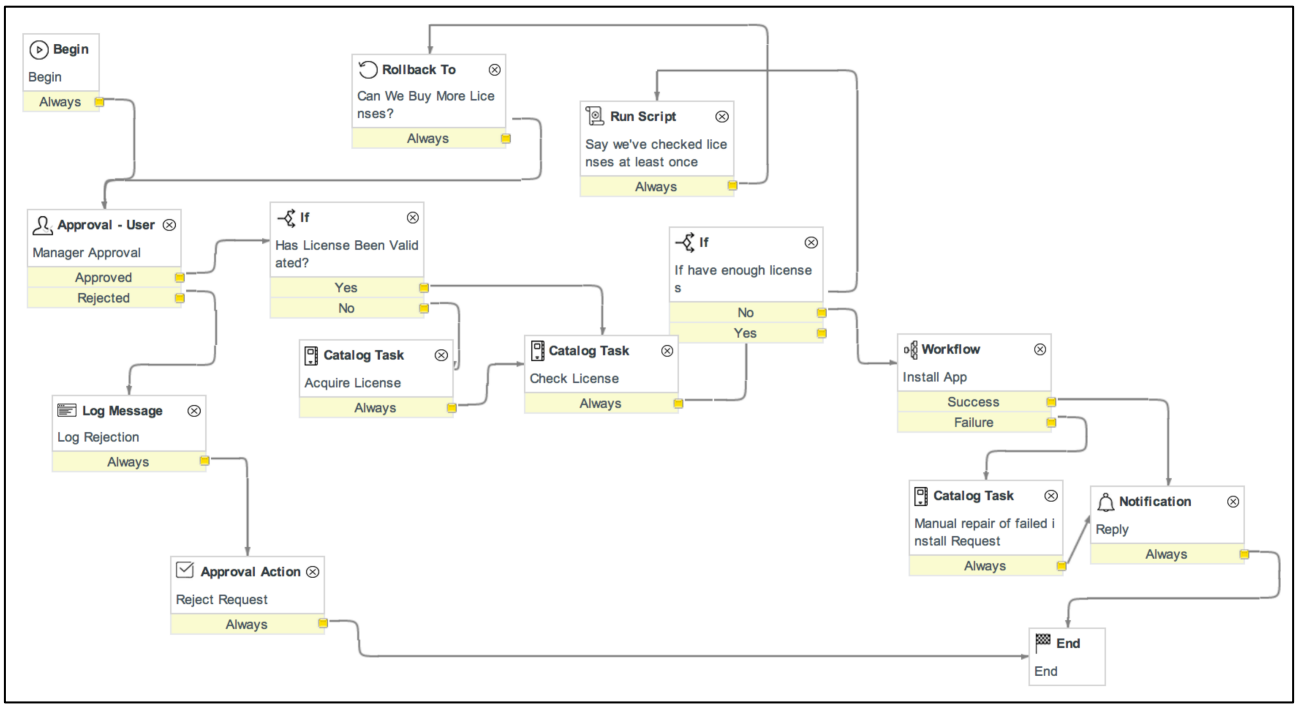
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13. Create a transition from **Failure** on the **Workflow** activity to the new **Catalog Task**.
14. Create a transition from **Success** on the **Workflow** activity to **Notification**.
15. Create a transition from the **Always** of the new **Catalog Task** to **Notification**.
16. Confirm that this part of the workflow is connected and appears as shown.



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17. Confirm that **K15 – Order Application** workflow appears as shown.



18. Click the hamburger menu and select **Publish** to publish the workflow.

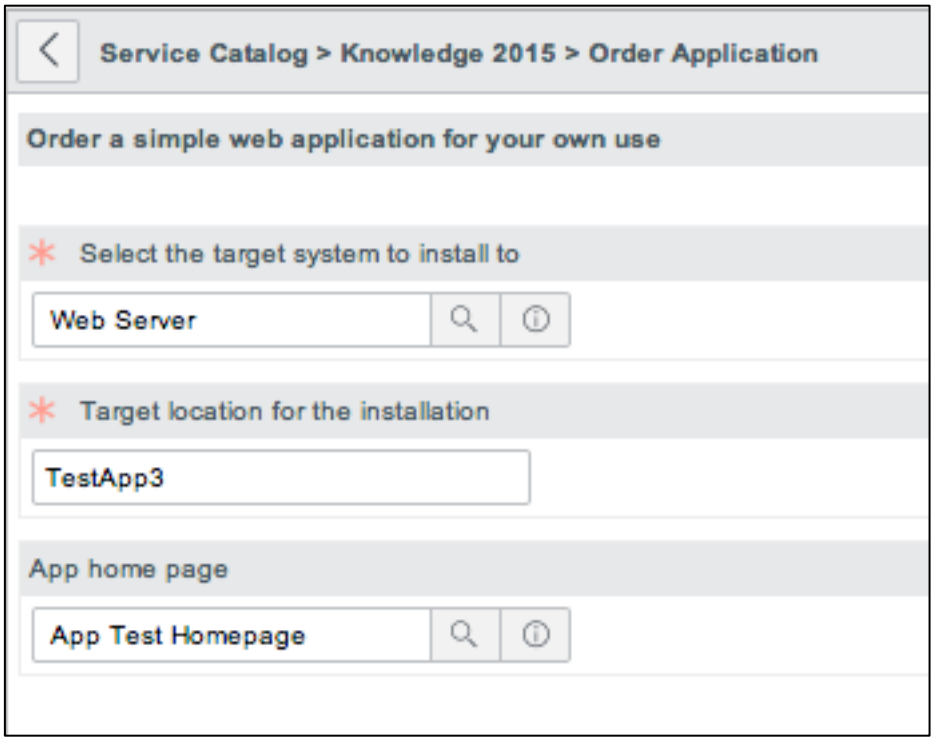
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Test the Entire Flow

Test the entire end-to-end scenario.

1. Navigate to **Self-Service > Service Catalog**.
2. Click on **Order Application** under the **Knowledge 2015** category.
3. Enter or select the following:

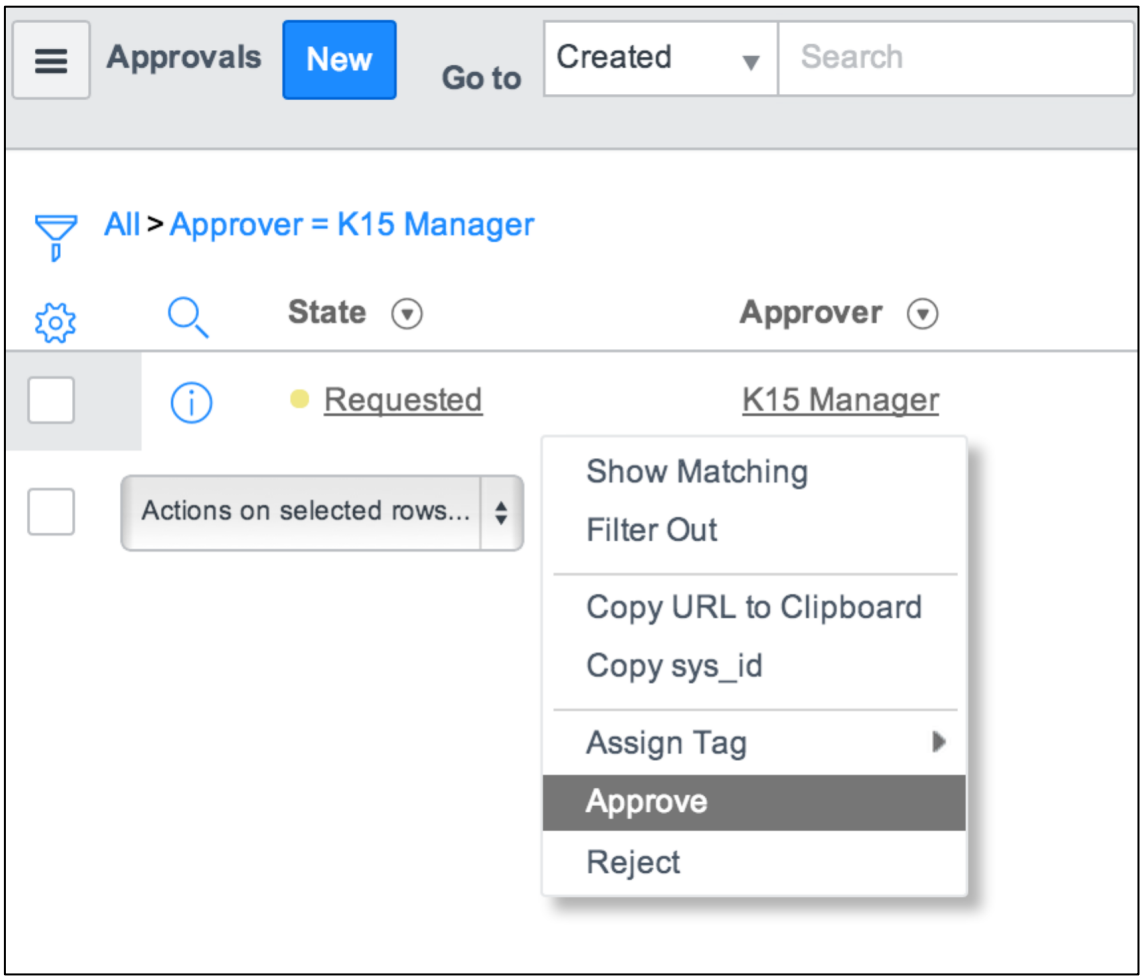
   Target system: **Web Server**
   Target location: **TestApp3**
   App home page: **App Test Homepage**



4. **C**lick **Order Now.**
5. Impersonate **K15 Manager**.
6. Navigate to **Service Desk > My Approvals**.

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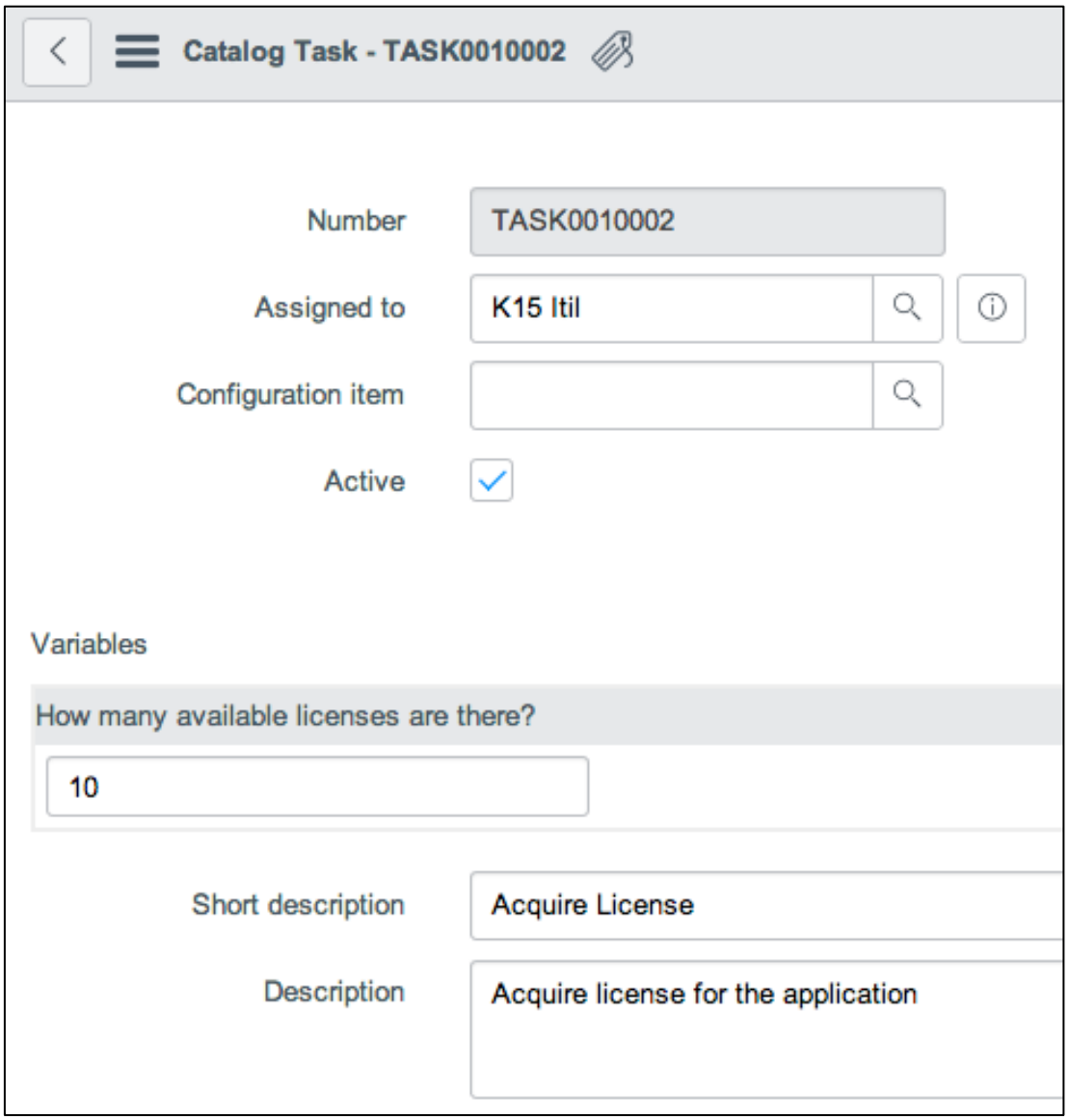
7. Right click on the requested item and click **Approve**.



8. Impersonate **K15 Itil**.
9. Navigate to **Service Desk > My Work**.
10. Open up the task **Acquire License**.

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11. Enter **10** in the variable field **How many available licenses are there?**



12. Click **Close Task**.

13. Navigate to **Service Desk > My Work**.

14. Open the task **Verify license for application installation**.

15. Select **Yes** in the **Have we already checked licenses**? option.

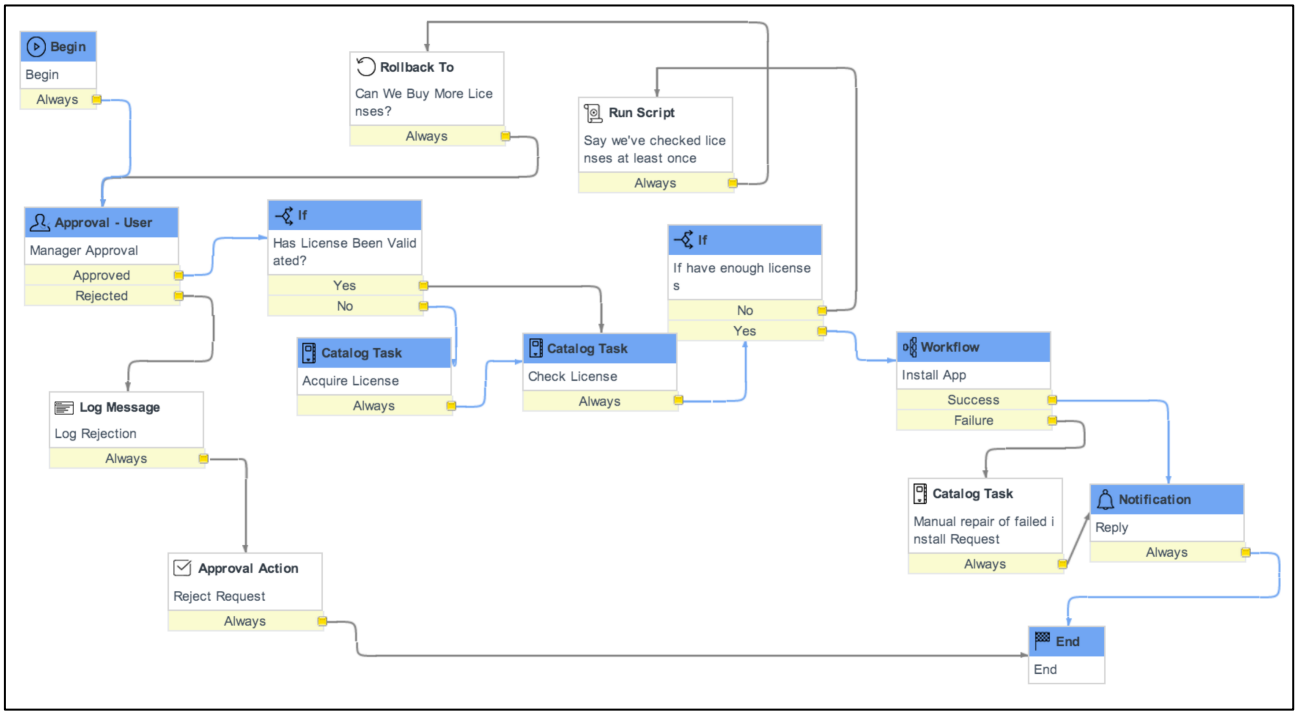
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16. Click **Close Task**.

17. Impersonate **System Administrator**.

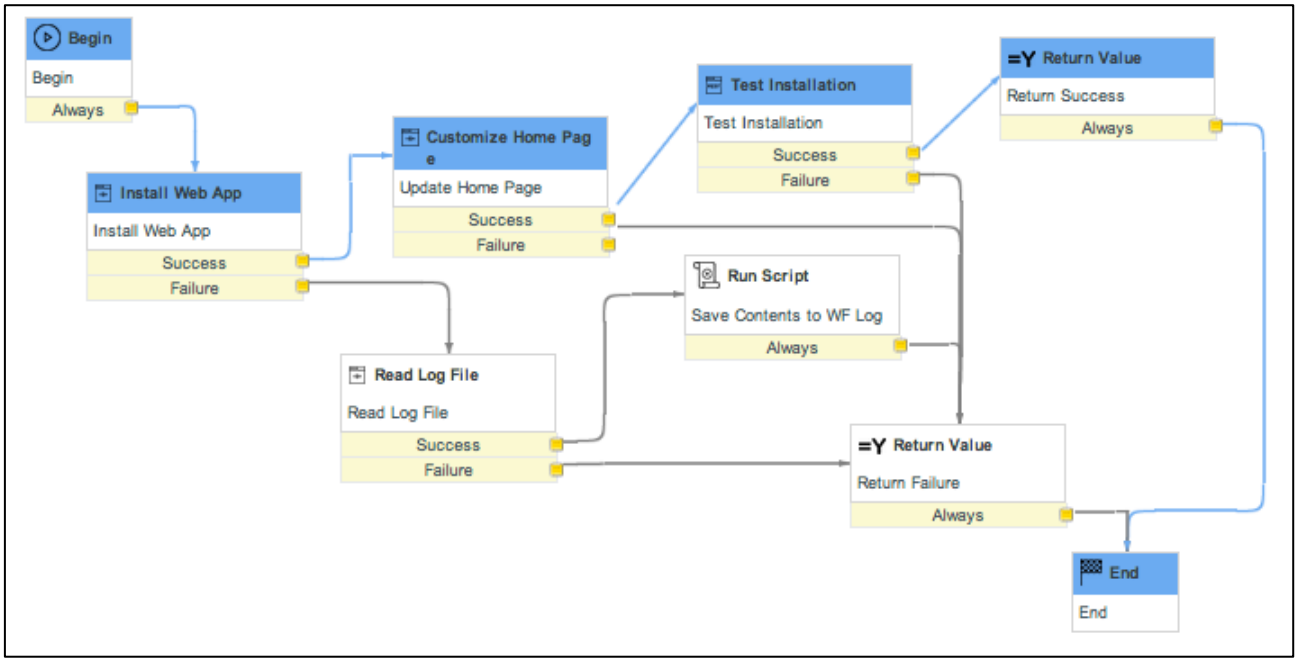
18. Navigate to **Workflow > All Contexts**, view the two workflow contexts. When the parent workflow completes, navigate to the resulting webpage. Your request was successful!

    K15 Order Application workflow:



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Install App workflow:



Progress Report

1. Navigate to **Lab Management**> **Report Lab Progress.**
2. Click **I am done!**

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