Streamlining Change Management with Business Rules

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Software Engineer

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Streamlining Change Management with Business Rules

Who We Are

- Kennedy Space Center, Florida

- Talents
  - Engineers
  - IT
  - Software Development

- Our Job
  - Administer
    - Improve/Automate processes

- Not our Job
  - Server Side
Streamlining Change Management with Business Rules

WHAT ARE BUSINESS RULES?

- **Persistable Windchill objects**
  - Set
  - Rule
  - Link

- **Control the quality of data**
  - Don’t let improperly configured data through.

- **Reduce the time to complete tasks**
  - Does the validation before the checker/approver even gets the task.
  - Can automatically reroute if there is a fail.

- **Customizable to meet specific needs**
  - Check for attributes, state of the object or even states of dependent objects.
BUSINESS RULE OBJECTS

- Sets
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BUSINESS RULE OBJECTS

• Sets, Rules

SET

RULE

RULE

RULE
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BUSINESS RULE OBJECTS

• Sets, Rules, and Links
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BUSINESS RULE OBJECTS

• Sets, Rules, and Links

• Link to other sets
## BUSINESS RULE OBJECTS

<table>
<thead>
<tr>
<th>Business Rule Selector</th>
<th>Rule Validation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHECKOUT_RULE</td>
<td>CheckoutRuleValidator</td>
<td>Validates that objects are not checked out.</td>
</tr>
<tr>
<td>RELEASE_TARGET</td>
<td>ReleaseTargetValidator</td>
<td>Ensures that all “Resulting Objects” are at an appropriate state for release and have an appropriate change management transition specified that is consistent with the assigned lifecycle transition rules.</td>
</tr>
<tr>
<td>ATTRIBUTE_RULE</td>
<td>AttributeRuleValidator</td>
<td>Validates that the specified attribute rule configuration for an object type is valid.</td>
</tr>
<tr>
<td>BOM_RELEASE_RULE</td>
<td>BOMReleaseRuleValidator</td>
<td>Ensures that all resulting objects are at an appropriate state and all their first level children are at an appropriate state.</td>
</tr>
</tbody>
</table>
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CREATING BUSINESS RULES (Traditional Approach)

• XML files
  – Set.xml
  – Rule.xml *
  – Link.xml *
  – LoadFile.xml

• Zip the business rule objects.
  – The set, rule and link files

• Call out the LoadFile.xml
  – Use the LoadFromFile command in a Windchill shell
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CREATING BUSINESS RULES (Traditional Approach)

• **XML Tips**
  – Must follow standardX20.dtd
    • `<Windchill>codebase\registry\ixb\dtds\standardX20.dtd\businessRules.dtd`
    • Defines the elements and the structure of the XML document
  – Check your spelling!
    ```xml
    </BusinessRuleLink>  
    </localID>           
    </localId>
    ```
  – White space is preserved
    ```xml
    <key>
    ACME_PART_ATTRIBUTE_RULE
    </key>
    ```
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EXAMPLES ATTRIBUTES

• **Requirements**
  – WTPart number must begin with an ‘A’
  – WTPart cage code must be from the set
    • [ACM01, ACM02, ACM03, ACM04]

• **To Do**
  – Create set.xml file
  – Create rule.xml file
  – Create link.xml file
  – Create load.xml file
  – Execute load from file command
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE BusinessRuleSet SYSTEM "standardX20.dtd">
<BusinessRuleSet>
  <ObjectID>
    <localId>wt.businessRules.BusinessRuleSet:00001</localId>
  </ObjectID>
  <objectContainerPath>/wt.inf.container.OrgContainer=ACME</objectContainerPath>
  <key>ACME_PRE_RELEASE II</key>
  <name>ACME_ReleaseRuleSet</name>
  <description>To test basic Attribute RuleSet Validation</description>
  <enabled>true</enabled>
  <overridable>true</overridable>
  <updateIfExists>true</updateIfExists>
</BusinessRuleSet>
CREATING BUSINESS RULES

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE BusinessRule SYSTEM "standardX20.dtd">
<BusinessRule>
  <ObjectID><localId>wt.businessRules.BusinessRule:000001</localId></ObjectID>
  <objectContainerPath>/wt.inf.container.OrgContainer=ACME</objectContainerPath>
  <key>ACME_PART_ATTRIBUTE_RULE</key>
  <selector>ATTRIBUTE_RULE</selector>
  <name>ACME Number Rule</name>
  <description>Number must always begin with an ‘A’</description>
  <enabled>true</enabled>
  <updateIfExists>true</updateIfExists>
  <configs>
    <config name="objectType" value="wt.part.WTPart"/>
    <config name="CAGE_CODE" value="[ACM01, ACM02, ACM03, ACM04]"/>
    <config name="number" value="BEGINSWITH(A)"/>
  </configs>
</BusinessRule>
```

RULE (wt.businessRules.BusinessRule)
- **Configs**
  - Name-Value pair
  - Name is the internal name
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CREATING BUSINESS RULES

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE BusinessRuleLink SYSTEM "standardX20.dtd">
.BusinessRuleLink
  <ObjectID>
    <localId>wt.businessRules.BusinessRuleLink:000001</localId>
  </ObjectID>
  <ruleSet>
    <ObjectReference>
      <localId>wt.businessRules.BusinessRuleSet:000001</localId>
    </ObjectReference>
  </ruleSet>
  <rule>
    <ObjectReference>
      <localId>wt.businessRules.BusinessRule:000001</localId>
    </ObjectReference>
    <blockNumber>1</blockNumber>
    <updateIfExists>true</updateIfExists>
  </rule>
</BusinessRuleLink>
```

LINK (wt.businessRules.BusinessRuleLink)
- Reference Set
- Reference Rule
- State block number
LOADING BUSINESS RULES

LoadRules.xml

- Call this file from a Windchill shell
- If any of the xml files are not formatted correctly, an error will be thrown and nothing will be imported*

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE NmLoader SYSTEM "standardX20.dtd">
<NmLoader>
  <csvExecuteImport handler="wt.load.LoadImport.executeImport">
    <csvimportFilename>loadFiles/ixbImport/Examples/One/RuleConfiguration_One.zip</csvimportFilename>
  </csvExecuteImport>
</NmLoader>
```

**windchill wt.load.LoadFromFile -d <Windchill>\pathTo\LoadRules.xml**
LOADING BUSINESS RULES

Windchill Shell Output

- All objects were imported successfully.
- Check method server output for successful completion of all loads.
LOADING BUSINESS RULES

**Windchill Shell Output**
- All objects were imported successfully.
- Check method server output for successful completion of all loads.

**Method Server Log Output**
- Unable to create a BusinessRuleLink object without both a ruleSet and a rule
- All objects were imported successfully
LOADING BUSINESS RULES

Windchill Shell Output
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- Unable to create a BusinessRuleLink object without both a ruleSet and a rule
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<th>Description</th>
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<td>ACME_ReleaseRuleSet</td>
<td>Rocket</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>To test basic Attribute RuleSet Validation</td>
</tr>
<tr>
<td>CHANGEABLE_PRE_RELEASE</td>
<td>Change Pre-Release Validation</td>
<td>Site</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>Business Rule Set used before objects are released as part of</td>
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LOADING BUSINESS RULES

Windchill Shell Output
- All objects were imported successfully.
- Check method server output for successful completion of all loads.

Method Server Log Output
- Unable to create a BusinessRuleLink object without both a ruleSet and a rule
- All objects were imported successfully

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LOADING BUSINESS RULES

Windchill Shell Output

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Default Change Notice Workflow

- Edit Change Notice Workflow
  - Edit conditional in Resolve Conflicts loop.
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Configure Workflow

Default Change Notice Workflow

• Change name of set to the newly created set

```java
com.ptc.core.businessRules.engine.BusinessRuleSetBean defaultBean =
    "wt.change2.ChangeRecord2");
```
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Configure Workflow

Release Part

![Diagram of part attributes]

- **Product:** Rocket
- **Type:** Part
- **Number:** B00001
- **Name:** ACME X1 Rocket
- **Version:** A4 (Design)

**Attributes**

- **Assembly Mode:** Separable
- **Source:** Make
- **Cage Code:** ACM-0
- **Design Authority:**
- **ITAR Controlled:**
  - Undefined
  - Yes
  - No
- **Weight:** 10000 KG
Configure Workflow

Resolve Release Conflicts task
• Click on View Rule Conflicts
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Configure Workflow

Resolve Release Conflicts task
• Click on View Rule Conflicts
• View conflicts
Creating Business Rules – (Custom Approach)

- No more XML files
  - No longer have to be familiar with XML syntax
  - Cuts down on human error
  - Saves time

- No more local actions
  - Some administrators do not have access

- Windchill API
  - Utility Class
    - Query, Create, Modify and Delete
  - JSP Web based GUI
    - Fast
    - Instant gratification
CREATING BUSINESS RULES – (Custom Approach)
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CREATING BUSINESS RULES – (Custom Approach)
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CREATING BUSINESS RULES – (Custom Approach)

Business Rules

Business Rule Sets
Choose Business Rule Set: ACME_PRE_RELEASE_II

SET
ID: ACME_PRE_RELEASE_II
NAME: ACME_ReleaseRuleSet
DESCRIPTION: To test basic Attribute RuleSet Validation
CONTEXT: ACME
ENABLED: true
OVERRIDABLE: true

RULE
ID: ACME_PART_ATTRIBUTE_RULE
NAME: ACME Number Rule
DESCRIPTION: Number must always begin with an 'A'
CONTEXT: ACME
SELECTOR: ATTRIBUTE_RULE
ENABLED: true
BLOCK: 1
CONFIG:
{CAGE_CODE=[ACM01, ACM02, ACM03, ACM04], objectType=wt.part.WTPart, number=BEGINSWITH(A)}

Edit Rule
New Rule Edit Set
CREATING BUSINESS RULES – (Custom Approach)

- Requirements
  - Required Attributes must be set
  - Number must start with an ‘A’
  - Number must end with a ‘-PT’
  - Number cannot contain special characters
  - Part cannot be from a vendor
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**EXAMPLES ATTRIBUTES**

![Edit Rule Form](image)

- **Attribute**: RC_ATTRIBUTE_RULE
- **Current**: Cannot Modify
- **New**: ROCKET_CONFIG
- **SET**: ROCKET_CONFIG
- **NAME**: Attribute Rule
- **DESCRIPTION**: Verify required attributes are filled in.
- **CONTEXT**: ACME (ORG) - ACME
- **ENABLED**: true
- **BLOCK**: 2
- **CONFIG**: Add Config
- **SELECTION**: ATTRIBUTE_RULE

**Edit Rule Properties**

<table>
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<th>Current</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td>RULE ID</td>
<td>RC_ATTRIBUTE_RULE</td>
<td>Cannot Modify</td>
</tr>
<tr>
<td>SET</td>
<td>ROCKET_CONFIG</td>
<td>ROCKET_CONFIG</td>
</tr>
<tr>
<td>NAME</td>
<td>Attribute Rule</td>
<td>Attribute Rule</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>Verify required attributes are filled in.</td>
<td>Verify required attributes are filled in.</td>
</tr>
<tr>
<td>CONTEXT</td>
<td>ACME</td>
<td>ACME (ORG) - ACME</td>
</tr>
<tr>
<td>ENABLED</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>BLOCK</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>CONFIG</td>
<td></td>
<td>Add Config</td>
</tr>
<tr>
<td>SELECTION</td>
<td>ATTRIBUTE_RULE</td>
<td>ATTRIBUTE_RULE</td>
</tr>
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EXAMPLES ATTRIBUTES

![Diagram of Edit Rule interface with example settings:]

- **KEY**: CAGE_CODE
- **VALUE**: SET
- **CONTEXT**: ACME
- **ENABLED**: true
- **BLOCK**: 2
- **CONFIG**: 
- **SELECTOR**: ATTRIBUTE_RULE

[Options: Add Config, Close]
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EXAMPLES ATTRIBUTES

```
Edit Rule Properties

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<td>ACME</td>
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</tr>
<tr>
<td>ENABLED</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>BLOCK</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>CONFIG</td>
<td>CAGE_CODE=SET, DESIGN_AUTH=SET, ITAR_CONTROLLED=SET, WEIGHT=SET,</td>
<td>Add Config</td>
</tr>
<tr>
<td>SELECTOR</td>
<td>ATTRIBUTE_RULE</td>
<td>ATTRIBUTE_RULE</td>
</tr>
</tbody>
</table>
```

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EXAMPLES BOM RELEASE

- Create Set
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EXAMPLES  BOM RELEASE

• Create Set
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EXAMPLES BOM RELEASE

• Create Set
• Create Rule
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EXAMPLES  BOM RELEASE

• Create Set
• Create Rule
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EXAMPLES  BOM RELEASE

- Create Set
- Create Rule
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EXAMPLES BOM RELEASE

- Create Set
- Create Rule
- Add configs
  - targetState
  - collectionComponentID
  - validDependentState
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EXAMPLES BOM RELEASE

• Create Set

• Create Rule

• Add configs
  – targetState
  – collectionComponentID
  – validDependentState
EXAMPLES  BOM RELEASE

• Release End Item
  – Structure has items In-Work
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EXAMPLES BOM RELEASE

• View Conflicts as usual
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References

• Windchill Help Center

• Windchill eSupport

• Windchill Javadocs

• W3Schools – XML Syntax
  – http://www.w3schools.com/xml/xml_syntax.asp
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