Streamlining Change Management with Business Rules

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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
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.
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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

Diagram showing a set with three rules linked.
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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
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!

- White space is preserved
STREAMLINING CHANGE MANAGEMENT WITH BUSINESS RULES

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
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CREATING BUSINESS RULES

```xml
<?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>
```

SET (wt.businessRules.BusinessRuleSet)

- Identification
  - OID
  - Key
  - Name
- Where
  - Container Path
- Other
  - Description
  - Enabled
  - Overridable
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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>
    <config name="CAGE_CODE" value="[ACM01, ACM02, ACM03, ACM04]"></config>
    <config name="number" value="beginswith(A)"></config>
  </configs>
</BusinessRule>
```

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

<?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>
  </rule>
  <blockNumber>1</blockNumber>
  <updateIfExists>true</updateIfExists>
</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.
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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
- 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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<th>Enabled</th>
<th>Overrid...</th>
<th>Ord...</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACME_PRE_RELEASE</td>
<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>
</tr>
</tbody>
</table>
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

That doesn't look right!
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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.

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</thead>
<tbody>
<tr>
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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>ACME_PRE_RELEASE_II</td>
<td>ACME_ReleaseRuleSet</td>
<td>ACME</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>To test basic Attribute RuleSet Validation</td>
</tr>
<tr>
<td>ACME_PART_ATTRIBUTE_RULE</td>
<td>ACME Number Rule</td>
<td>ACME</td>
<td>Yes</td>
<td>1</td>
<td></td>
<td>Number must always begin with an ‘A’</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>
</tr>
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</table>
Configure Workflow

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 showing product attributes](image-url)
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)
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
  - New Set

- **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.WPart, number=BEGINSWITH(A)}
    ```

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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

<table>
<thead>
<tr>
<th>Attribute</th>
<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>(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>SELECTOR</td>
<td>ATTRIBUTE_RULE</td>
<td>ATTRIBUTE_RULE</td>
</tr>
</tbody>
</table>
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## Examples Attributes

<table>
<thead>
<tr>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAGE_CODE</td>
<td>SET[ ]</td>
</tr>
<tr>
<td>CONTEXT</td>
<td>ACME (ORG) - ACME ▼</td>
</tr>
<tr>
<td>ENABLED</td>
<td>true ▼</td>
</tr>
<tr>
<td>BLOCK</td>
<td>2</td>
</tr>
<tr>
<td>CONFIG</td>
<td></td>
</tr>
<tr>
<td>SELECTOR</td>
<td>ATTRIBUTE_RULE ▼</td>
</tr>
</tbody>
</table>

---

*Image of a GUI interface for managing attributes with key-value pairs.*
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**EXAMPLES ATTRIBUTES**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Current</th>
<th>New</th>
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</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>(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>CAGE_CODE=SET, DESIGN_AUTH=SET, ITAR_CONTROLLED=SET, WEIGHT=SET,</td>
<td></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
Streamlining Change Management with Business Rules

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

![Business Rules Diagram](image)
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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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