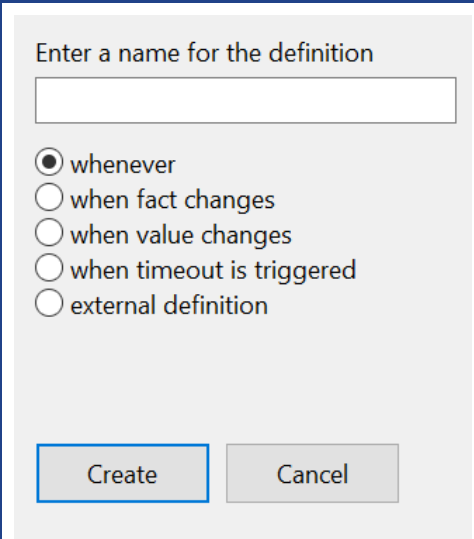


# Business rules Cheatsheet

When creating new BUSINESS RULES, you need to choose what type of definition it is and use various keywords to complete your definitions. The following tables are not a complete list of the available keywords, but show all the keywords covered in the SmartSpace Fundamentals course, as well as others that are considered to be the most important. To see the full list of keywords, visit the [SmartSpace Business rules documentation](#).

When any of the Visibility, Business rules, Reporting or Applications integration components have been licensed, you are able to extend basic types with a greater selection of properties, called simple properties. This makes it possible to add many different property attributes to types so that they can hold the important characteristics, state and even relations for a type which allow it to become a true class of object for new user-defined applications.

Type of Definition	When to use	
	whenever	Create a rule. Rules allow you to define the value of a Boolean property using a series of logical statements. The value of a rule is re-evaluated automatically whenever the properties defining the rule change.
	when fact changes	Create an event where a property of a Boolean type changes to true or false. Event handlers define a series of actions that are performed when a property value changes, such as: <ul style="list-style-type: none"><li>• Creating/deleting an object</li><li>• Setting a property</li><li>• Changing a representation</li><li>• Sending a notification or email to a user</li></ul>
	when value changes	Create an event where the value of a non Boolean property changes from one value to another. This definition is also an event handler, and therefore follows the same series of actions as 'when fact changes'.
	when timeout is triggered	Create a timeout. Timeout handlers define a series of actions performed when triggered by the time value stored in the property linked to the handler is reached. Actions that can be performed when the timeout is triggered are the same as an event handler.

## Actions

Keyword	Definition and Example
<p><b>use new</b></p>	<p>Creates a new object of a selected object type for use in a subsequent action.</p> <pre>MRO Task Assignment Version 2.0 when the status of <i>assignment</i> changes from <i>old</i> to <i>new</i> do   use new Task Assignment Status Change called <i>change</i> in     set the last status change of <i>assignment</i> to <i>change</i> ;     set the assignment of <i>change</i> to <i>assignment</i> ;     set the time of <i>change</i> to now.</pre>
<p><b>delete</b></p>	<p>Deletes an object from the user data store. If the object is stored in other data, such as a located object in a location cell, use the delete pending flag property to delete the object from all locations.</p> <p>Note that delete permanently removes the object, not unsets the value. To keep the object but unset the value, use null.</p> <pre>when <i>pallet</i> is empty becomes true do   delete <i>pallet</i></pre>
<p><b>and then</b></p>	<p>Creates an additional action slot to chain actions together and is represented by ':'</p> <pre>when <i>process area</i> contains <i>part</i> becomes false do   Action ;   Action</pre> <pre>when <i>process area</i> contains <i>part</i> becomes false do   set the current area of <i>part</i> to null ;   set the status of <i>part</i> to None</pre>
<p><b>for each</b></p>	<p>Performs a query in the 'where' clause to make a list of all the rows for which that query is true. For each row of that list, the function uses the row values to set the variables and then completes the action on those variables with those values.</p> <p>The simplest execution of 'for each' is to use a single object with the function iterating over a list and performing an action when each instance is true.</p>

Keyword	Definition and Example
	<pre> when <i>process area</i> contains <i>mhe</i> becomes false do   if <i>process area</i> is a <i>Storage Area</i> then     for each <i>part</i> where       the current area of <i>part</i> = <i>process area</i>     do       set the colour of <i>part</i> to Blue           </pre> <p>For a more complex example of 'for each', see below.</p> <pre> MRO Task Booking Version 1.0 when the site execution time of <i>operation</i> is triggered   if <i>operation</i> = Increment Booked Time then     for each <i>time</i> , <i>task booking</i> , <i>cursor</i> where       <i>time</i> = now - Min Zone Dwell Secs value / 1200 and       <i>cursor</i> = the cursor of <i>task booking</i> and       <i>time</i> &gt; <i>cursor</i> and       the end of <i>task booking</i> = null     do       set the cursor of <i>task booking</i> to <i>time</i>           </pre>
<p><b>if then</b></p>	<p>Performs an action if a specific fact is true.</p> <pre> when the colour of <i>part</i> changes from <i>old</i> to <i>new</i> do   if <i>new</i> != null then     set the hex value of <i>part</i> to the value of <i>new</i>           </pre>
<p><b>if then else</b></p>	<p>Performs an action if a specific fact is true, otherwise perform another action.</p> <pre> when <i>part category</i> for <i>order</i> is complete becomes true do   for each <i>category</i> where     quantity of <i>category</i> required for <i>order</i> != null and     <i>part category</i> != <i>category</i>   do     if <i>category</i> for <i>order</i> is complete then       set <i>order</i>         is ready to move to shipping from         the packing zone of <i>order</i> to         true     else       set <i>order</i>         is ready to move to shipping from         the packing zone of <i>order</i> to         false           </pre>

Keyword	Definition and Example
<b>set property</b>	<p>Sets the value of a property.</p> <pre>when the current area of <i>part</i> changes from <i>old</i> to <i>new</i> do   if <i>new</i> is a <u>Storage Area</u> then     set the status of <i>part</i> to Available</pre>
<b>set representation</b> <b>unset representation</b>	<p>Sets or unsets the representation for a specified representation mode of an object.</p> <pre>when <i>worker</i> is available becomes true do   set active representation of <i>worker</i> to green-person</pre>
<b>notify</b>  <b>notify near</b>  <b>notify near using</b>	<p>Sends a notification to a role on the web map.</p> <pre>when <i>order</i> is ready to move to shipping from <i>process area</i> becomes true do   notify Parts Manager</pre> <p>... including a specific object.</p> <pre>when <i>order</i> is ready to move to shipping from <i>process area</i> becomes true do   notify Parts Manager near <i>process area</i></pre> <p>... including an object located using a search.</p> <pre>when <i>order</i> is ready to move to shipping from <i>process area</i> becomes true do   notify Parts Manager near <i>process area</i> using Locate Parts Mgr</pre>

## Operators

Keyword	Definition and Example
<p><b>and</b></p>	<p>Evaluates as true if all the slots are true.</p> <div style="border: 1px solid #ccc; padding: 5px;"> <p>MRO Task Monitoring Version 2.0  <sup>4</sup>Keep a record of the currently-open work zone occupancy for each technicians.  <i>technician</i> is currently in <i>work zone</i> with <i>work zone occupancy</i> whenever  <span style="border: 1px solid red; padding: 2px;"> <i>technician</i> = the technician of <i>work zone occupancy</i> <b>and</b>  <i>work zone</i> = the zone of <i>work zone occupancy</i> <b>and</b>  the end of <i>work zone occupancy</i> = null </span> </p> </div> <div style="border: 1px solid #ccc; padding: 5px;"> <p>MRO Task Monitoring Version 2.0  <i>technician</i> in <i>doorway</i> with <i>wzo</i> is inferred to be in <i>room</i> whenever  <span style="border: 1px solid red; padding: 2px;"> <i>technician</i> is currently in <i>doorway</i> with <i>wzo</i> <b>and</b>  <i>room</i> = the interior of <i>doorway</i> <b>and</b>  the stale flag of <i>technician</i> </span> </p> </div>
<p><b>or</b></p>	<p>Evaluates as true if any one of the slots is true.</p> <div style="border: 1px solid #ccc; padding: 5px;"> <p><b>when</b> the Status of <i>worker</i> changes from <i>old</i> to <i>new</i> <b>do</b>  <span style="border: 1px solid red; padding: 2px;"> <b>if</b> <i>new</i> = Vacation <b>or</b> <i>new</i> = Training <b>then</b>  <b>set</b> <i>worker</i> is available to false </span> </p> </div>
<p><b>not</b></p>	<p>Returns true if none of its contents are true.</p> <div style="border: 1px solid #ccc; padding: 5px;"> <p>the update flag of <i>asset</i> whenever  <span style="border: 1px solid red; padding: 2px;"> <b>not</b> the name of <i>asset</i> = null <b>and</b> the update triggered flag of 10s update </span> </p> </div>
<p><b>=</b></p>	<p>Returns true if the two slots have the same value.</p> <div style="border: 1px solid #ccc; padding: 5px;"> <p><b>when</b> <i>process area</i> contains <i>part</i> becomes true <b>do</b>  <span style="border: 1px solid red; padding: 2px;"> <b>if</b> <i>process area</i> = Doorway Zone <b>then</b>  <b>set</b> <i>part</i> is contained by Storage Driver 1 to true </span> </p> </div>
<p><b>!=</b></p>	<p>Returns true if the two slots do not have the same value.</p> <div style="border: 1px solid #ccc; padding: 5px;"> <p><b>when</b> the colour of <i>part</i> changes from <i>old</i> to <i>new</i> <b>do</b>  <span style="border: 1px solid red; padding: 2px;"> <b>if</b> <i>new</i> != null <b>then</b>  <b>set</b> the hex value of <i>part</i> to the value of <i>new</i> </span> </p> </div>

Keyword	Definition and Example
<	<p>Returns true if the first slot is strictly less than the second.</p> <pre> when the load of <i>container</i> changes from <i>old</i> to <i>new</i> do   if (the load of <i>container</i> &lt; the capacity of <i>container</i>) then     set the status of <i>container</i> to Available                     </pre>
>	<p>Returns true if the first slot is strictly greater than the second.</p> <pre> when <i>part</i> is complete becomes true do   if (the completion time of <i>part</i> &gt; the target time of <i>part</i>) then     notify QA Manager                     </pre>
is a	<p>Tests the type of an object.</p> <pre> when <i>assertion point</i> has located <i>object</i> becomes true do   if <i>assertion point</i> = Assertion Point 1 and     <i>object is a Part</i> then     set <i>object</i> is contained by Storage Driver 1 to       false                     </pre>
there is a	<p>Checks for the existence of an object that matches some condition.</p> <pre> Equipment <i>equipment station</i> is occupied whenever   <i>there is a</i> Equipment called <i>equipment</i> where     <i>equipment station</i> contains <i>equipment</i>                     </pre>
contains	<p>Tests spatial containment.</p> <pre> <i>process area</i> contains <i>part</i> whenever   the extent of <i>process area</i>   contains   the origin of <i>part</i>                     </pre>
+, -, *, /	<p>Adds/subtracts/multiplies/divides the slots. For strings, using the addition operator concatenates the slots.</p> <pre> when the next update of <i>clock</i> is triggered   set the update triggered flag of <i>clock</i> to true ;   set the next update of <i>clock</i> to now + the update interval of <i>clock</i>                     </pre>

## Terms

Keyword	Definition and Example
<b>as string</b>	<p>Converts an integer value to a string.</p> <pre> Tool <b>when</b> the calibration status of <i>tool</i> <b>changes from</b> <i>old</i> <b>to</b> <i>new</i> <b>do</b>   <b>set</b> the label text of <i>tool</i> <b>to</b> the label text header of <i>tool</i> + the calibration period of <i>tool</i> <b>as string</b>           </pre>
<b>now</b>	<p>Returns the current date/time.</p> <pre> <b>when</b> the name of <i>part</i> <b>changes from</b> <i>old</i> <b>to</b> <i>new</i> <b>do</b>   <b>if</b> <i>new</i> <b>!=</b> <i>null</i> <b>then</b>     <b>set</b> the creation date of <i>part</i> <b>to</b> <b>now</b>           </pre>
<b>null</b>	<p>Unsets a value.</p> <pre> <b>when</b> <i>process area</i> contains <i>part</i> <b>becomes</b> <i>false</i> <b>do</b>   <b>set</b> the current area of <i>part</i> <b>to</b> <b>null</b> ;   <b>set</b> the status of <i>part</i> <b>to</b> <i>None</i>           </pre>
<b>hours between</b>	<p>Gets a difference in time based on a specified shift.</p> <pre> <b>when</b> the update flag of <i>asset</i> <b>becomes</b> <i>true</i> <b>do</b>   <b>set</b> the total age of <i>asset</i> <b>to</b> <b>hours between</b> the creation time of <i>asset</i> <b>and</b> <i>now</i> <b>on</b> <i>Nonstop</i>           </pre>
<b>hours in the future</b>	<p>Gets a time in the future based on a specified shift.</p> <pre> Bus <b>when</b> the route of <i>bus</i> <b>changes from</b> <i>old</i> <b>to</b> <i>new</i> <b>do</b>   <b>if</b> <i>new</i> = <i>Westbound Morning</i> <b>then</b>     <b>set</b> the route dispatch time of <i>bus</i> <b>to</b> <b>0.5 hours in the future on</b> <i>Morning</i>           </pre>
<b>shift</b>	<p>Returns the string which is the value of <i>log duration in shift</i> for an object, or <i>No Shift</i>.</p> <pre> Bus <b>when</b> the route of <i>bus</i> <b>changes from</b> <i>old</i> <b>to</b> <i>new</i> <b>do</b>   <b>set</b> the shift label of <i>bus</i> <b>to</b> the shift label header of <i>bus</i> + <b>the shift of</b> <i>old</i>           </pre>

## Scenarios

Scenario	Example
Triggering a rule on object creation/deletion	<pre>MRO Task Booking Version 1.0 <b>when</b> the name of <i>aircraft zone</i> changes from <i>old</i> to <i>new</i> <b>do</b>   <b>if</b> <i>new</i> = <b>null</b> <b>and</b> the site execution time of Enforce Zone Referential Integrity = <b>null</b> <b>then</b>     <b>set</b> the site execution time of Enforce Zone Referential Integrity <b>to now + 5 / 3600</b></pre>
Building a counter	<pre><b>when</b> <i>technician</i> is in <i>work zone</i> <b>becomes false</b> <b>do</b>   <b>set</b> <i>work zone</i> occupancy count <b>to</b>     <i>work zone</i> occupancy count - 1</pre> <pre><b>when</b> <i>technician</i> is in <i>work zone</i> <b>becomes true</b> <b>do</b>   <b>if</b> <i>work zone</i> occupancy count = <b>null</b> <b>then</b>     <b>set</b> <i>work zone</i> occupancy count <b>to 0</b> ;   <b>set</b> <i>work zone</i> occupancy count <b>to</b>     <i>work zone</i> occupancy count + 1</pre> <p>It is also possible to count objects using external definitions. More information about external definitions can be found in the <a href="#">documentation</a>.</p>