

Learner's guide to Program Rules

PERFORM THESE EXERCISES IN THE CONFIG SYSTEM. USE THE TB Program you have created.

What is this guide?

This guide contains all exercises and detailed steps to perform them related to the configuration of programs for the Tracker Config Level 1 academy. Please perform each of the exercises when prompted by your instructors.

Learning objectives for this session

The overall objective of this session is to demonstrate how to create program rules in DHIS2 for both event and tracker programs. Detailed objectives include:

- Define the program rules concept
- Define the steps to consider when creating a program rule
- Create program rules using variables, expressions and actions in DHIS2

Background

Program rules allow you to create and control dynamic behavior of the user interface in the Tracker Capture and Event Capture apps. Program rules give functionality to configure dynamic behavior in the programs in DHIS2 that are implemented on the paper forms through skip logic, warnings and patterns as well as auto filling some fields.

Program Rules Reference

In reality, it is difficult to remember all of the rule operators and actions that are possible to use. It is likely you will need to reference the [documentation](#) from time to time as it is a useful resource regarding what types of expressions, operators and actions you can use.

Exercises

In order to create a program rule, we can follow these general guidelines:

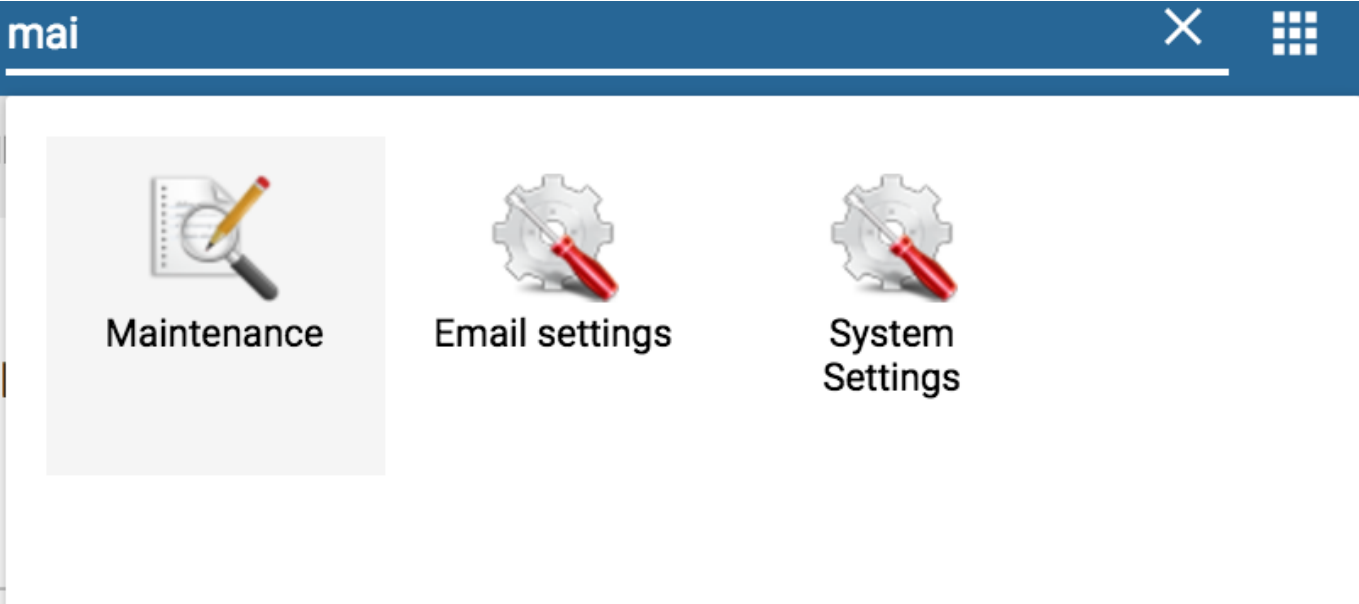
1. Conceptualise the logic of the rule you want to create
2. Create a program rule variable that points to the data element/attribute which will trigger your logic
3. Create a new program rule
 1. Fill in the program rule details
 1. Select the program
 2. Provide a name and description
 3. Assign a priority if applicable
4. Enter the program rule expression 2. Refer the the [documentation](#) to see many examples of the items that can be used within the expression, as well as examples of expressions
5. Define the program rules actions 3. Refer to the [documentation](#) for more detail on each individual action

6. Clear your cache and test the rule!

Exercise 1 - In the first example, we will create a program rule for the TB program which hides the “EPTB Site” data element if the TB is not classified as extra-pulmonary.

Step 1 - Access the Program and attribute app

**Log into the blank instance and go to Maintenance App **



and click on Program

ALL	CATEGORY	DATA ELEMENT	DATA SET	INDICATOR	ORGANISATION UNIT	PROGRAM	VALIDATION	OTHER
<div><div>Program</div><div>Tracked entity attribute</div><div>Relationship type</div><div>Tracked entity</div><div>Program rule</div><div>Program rule variable</div></div>	Program	<div><div>Program</div><div>Create, modify and view programs. A program has program stages and defines which actions should be taken at each stage.</div><div>+⋮</div></div>						
	Tracked entity attribute	<div><div>Tracked entity attribute</div><div>Create, modify and view tracked entity attributes. An attribute can be used to register extra information for a tracked entity.</div><div>+⋮</div></div>						
	Relationship type	<div><div>Relationship type</div><div>Create, modify and view relationship types. A relationship is typically wife and husband or mother and child.</div><div>+⋮</div></div>						
	Tracked entity	<div><div>Tracked entity</div><div>Define types of entities which can be tracked through the system, which can be anything from persons to commodities.</div><div>+⋮</div></div>						
	Program rule	<div><div>Program rule</div><div>Program rules allow you to create and control dynamic behavior of the user interface in the Tracker Capture and Event Capture apps.</div><div>+⋮</div></div>						
	Program rule variable	<div><div>Program rule variable</div><div>Variables you use to create program rule expressions.</div><div>+⋮</div></div>						

NOTE: To create a new program rule, you may need to first create Program rule variables

Step 2 - Create the program rule variable

To create a new program rule variable. You need to first create Program rule variables before creating your rules.

Click on Program rule variable and Add

Use your initials as a prefix when creating the variable to keep the name unique.

Program (*)

TB Treatment Card

Name (*)

TBDiseaseSite_current



Use code for option set

Source type (*)

Data element in current event

Data element

TBTC|TB Disease Site

SAVE

CANCEL

- **Use code for option set:** When your variable is using an option set, this allows you to select whether or not you will use the option set code rather than the value when creating your program rule expressions. It is often useful to use the code as this is less subject to change than the value. You may not want to use the code however if you are displaying feedback of some kind for example.
- **Source type:** The source type is determining how the source field is populated with a value. Please refer to the [documentation](#) for the latest info.

The majority of the time you will be using "data element in current event" or "Tracked entity attribute" however there are uses for the other fields. We will explain them further in additional examples.

Step 3 - Create the program rule

**To create a new program rule, Click on Program rule and Add (the "+" symbol)

Enter Program rule details

1 Enter program rule details 2 Enter program rule expression 3 Define program rule actions

Program (*)
TB Treatment Card

Trigger rule only for program stage

Name (*)
Disease site: blank or Pulmonary

Description
Hide EPTB site when the disease site has no value or the disease site is pulmonary

Priority

SAVE CANCEL

Do not worry about the priority for now. This will be covered in other trainings/academies.

Enter the Program rule expression

Create an expression, for example `#{TBDiseaseSite_current} == '' || #{TBDiseaseSite_current} == 'Pulmonary'`

Recall the operators from the [documentation](#) that are now present along the bottom row. You will be using an expression that includes the **** equals to**** and ****OR**** logical operators in this example.

1 Enter program rule details 2 Enter program rule expression 3 Define program rule actions

Condition

`#{TBDiseaseSite_current} == '' || #{TBDiseaseSite_current} == 'Pulmonary'`

- Built in variables
- Variables
- Functions

+ - * / % > >= < <= == !=

NOT AND OR

✓ TB Disease Site == '' || TB Disease Site == 'Pulmonary'

Create the action ("Hide Field" on EBTB Site Data Element).

At this stage explain the various actions that are available once again.

The full list of actions can be viewed in the [documentation](#).

Define program rule action

Action (*)

Hide field

Data element to hide

TBTC|EPTB Site

Tracked entity attribute to hide

Custom message for
blanked field

CANCEL

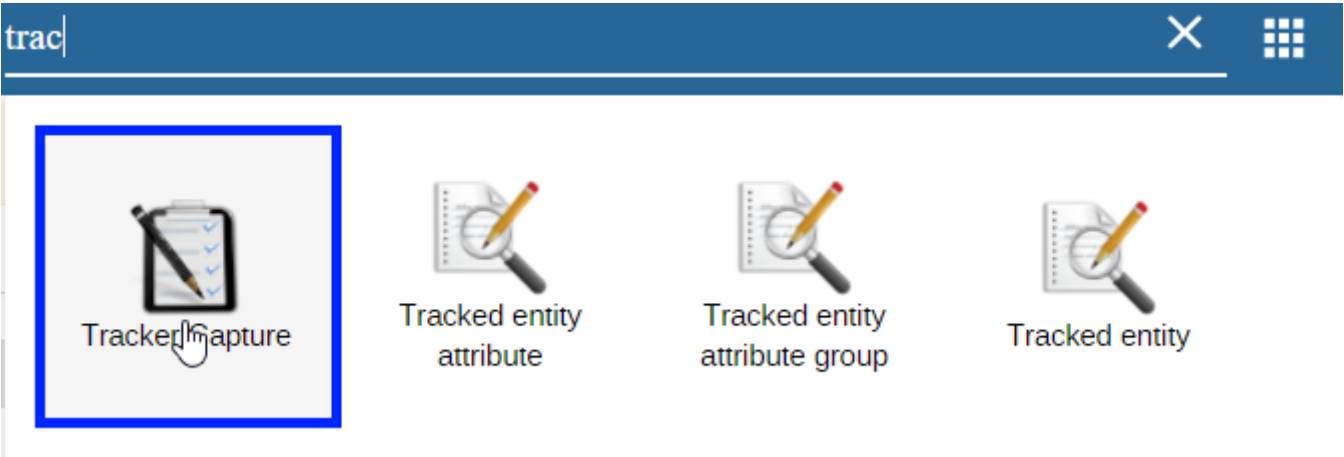
COMMIT

and click on **COMMIT** to save. **SAVE** the program rule before continuing.

Step 3 -Test the Program Rule

You may need to clear your cache or reload in incognito mode so the rule works correctly.

Go to tracker capture to show the rule in action



Register a new person

Enrollment

Enrolling organisation unit

Group 01

Registration Date

2017-02-10

Profile

Registration Number

1234564698

First Name

Test

Last Name

Name

Age (in years)

28

Sex

Female



Address

1234 Test St

Phone number

78956132

Save and continue

Save and add new

Print form

Cancel

We can see immediately that the rule is working, as there is no value for disease site and the EPTB site data element is hidden.

Selecting Pulmonary yields the same result

TB Patient Type	Select or search from the list
TB Disease Site	Select or search from the list
Type of Treatment	Select or search from the list

Select Pulmonary yields the same result

TB Disease Site	Pulmonary
Type of Treatment	Select or search from the list

Only when we select Extra Pulmonary does the EPTB site data element appear. This is the intended action of the rule.

TB Disease Site	Extra-Pulmonary
EPTB Site	Select or search from the list
Type of Treatment	Select or search from the list

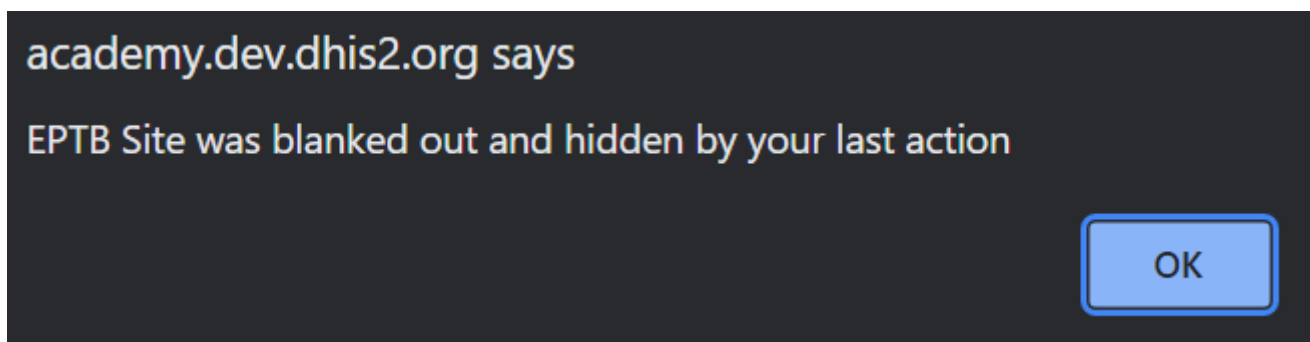
Note that if you select an EPTB site

TB Disease Site	Extra-Pulmonary
EPTB Site	Pleura

However go back and change the TB Disease site to Pulmonary

TB Disease Site	Pulmonary
Type of Treatment	Select or search from the list

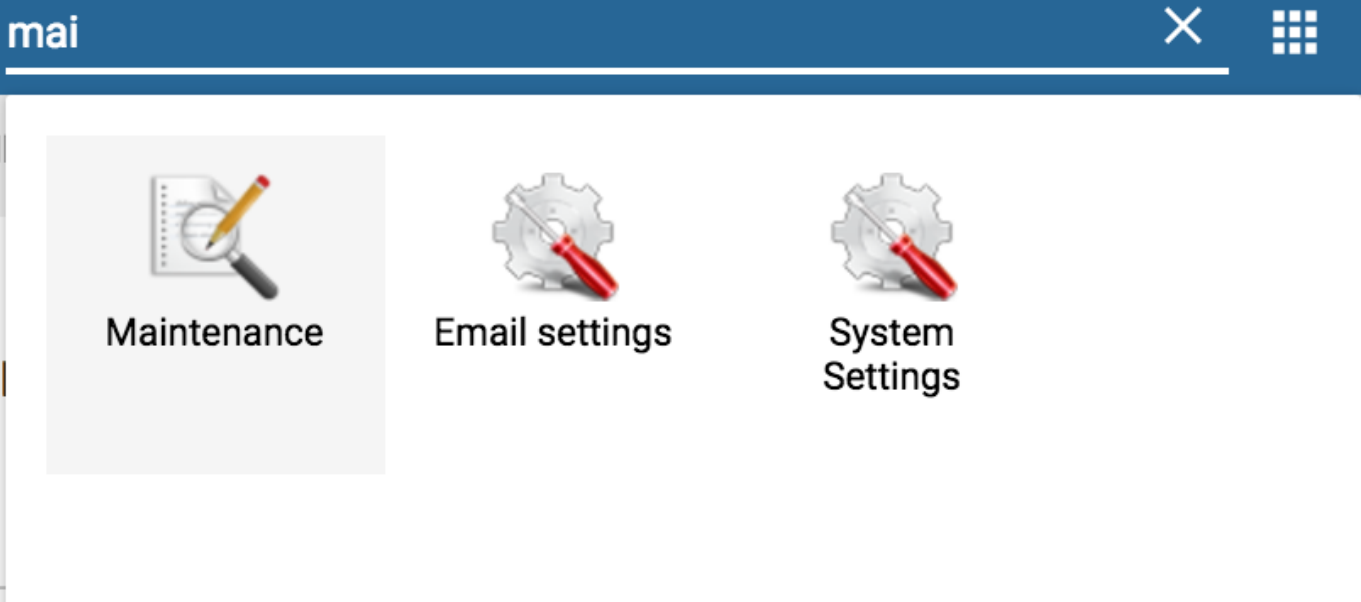
You will get an error message saying that the EPTB Site value was deleted. The logic here is that unless the disease site is extra-pulmonary, the EPTB site value is hidden and therefore can not have a related value entered within it.



Exercise 1 - Create a program rule to hide pregnant if Age is less than 18 and Gender is Male using the TB Program

Access the Programs rules from Maintenance App ⇒ Program

Log into the blank instance and go to Maintenance App



and click on Program

ALL	CATEGORY	DATA ELEMENT	DATA SET	INDICATOR	ORGANISATION UNIT	PROGRAM	VALIDATION	OTHER
<div><div>Program</div><div>Tracked entity attribute</div><div>Relationship type</div><div>Tracked entity</div><div>Program rule</div><div>Program rule variable</div></div>		<div><div>Program</div><div>Create, modify and view programs. A program has program stages and defines which actions should be taken at each stage.</div><div><div>+</div><div>≡</div></div></div>	<div><div>Tracked entity attribute</div><div>Create, modify and view tracked entity attributes. An attribute can be used to register extra information for a tracked entity.</div><div><div>+</div><div>≡</div></div></div>	<div><div>Relationship type</div><div>Create, modify and view relationship types. A relationship is typically wife and husband or mother and child.</div><div><div>+</div><div>≡</div></div></div>	<div><div>Tracked entity</div><div>Define types of entities which can be tracked through the system, which can be anything from persons to commodities.</div><div><div>+</div><div>≡</div></div></div>			
		<div><div>Program rule</div><div>Program rules allow you to create and control dynamic behavior of the user interface in the Tracker Capture and Event Capture apps.</div><div><div>+</div><div>≡</div></div></div>	<div><div>Program rule variable</div><div>Variables you use to create program rule expressions.</div><div><div>+</div><div>≡</div></div></div>					

Remember to use your initials as a prefix when creating these objects to keep the names unique.

Add in a new program rule variable

Program (*)

TB Treatment Card

Name (*)

age

☐ Use code for option set

Source type (*)

Tracked entity attribute

Tracked entity attribute

TB Treatment Card Age

SAVE

CANCEL

And



Program (*)

TB Treatment Card

Name (*)

sex

☐

Use code for option set

Source type (*)

Tracked entity attribute

Tracked entity attribute

TB Treatment Card Sex

SAVE

CANCEL

Create a Program Rule Hide pregnant if sex is less than 18 and sex is Male

Enter the program rule details.

In the expression, we are using numbers. There are no quotes needed around the number. We will also hide the pregnant if sex is Male.

45

1

Enter program rule details

2

Enter program rule expression

Condition

A{age} < 18 && A{sex} == 'MALE'

+ - * / % > >= < <= == !=

NOT AND OR

▶ BL

▶ Vε

▶ FL

✓

Age < 18 && Sex == 'MALE'

Test the rule with the participants

Clear the cache if needed, than go to tracker capture to test the rule

Pregnant should be hidden if age is less than 18 and sex is Male

Profile

TB Registration Number	JG8109259
First Name	
Last name	
Sex	Select or search from the list
Date of Birth	yyyy-MM-dd
Age	
Pregnant	<input type="radio"/> Yes <input type="radio"/> No
Family Address	
Phone number	

It should show

Profile

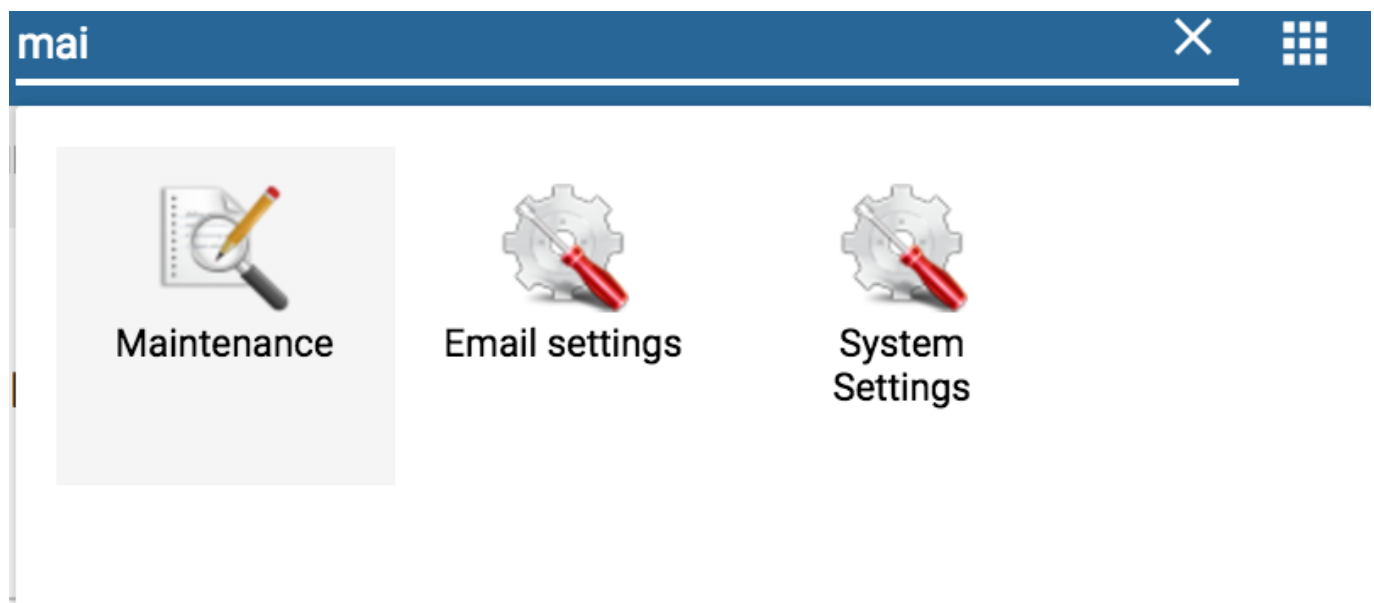
TB Registration Number	DE8474236
First Name	<input type="text"/>
Last name	<input type="text"/>
Sex	Male ✕ ▼
Date of Birth	2009-05-20
Age	14
Family Address	<input type="text"/>
Phone number	<input type="text"/>

[Save and continue](#) [Save and add new](#) [Print form](#) [Cancel](#)



















Exercise 3 - Create another program rule for the TB Treatment Card which displays a warning message when Weight is out of range

Access the Programs rules from Maintenance App ⇒ Program

Log into the blank instance and go to Maintenance App



and click on Program

ALL	CATEGORY	DATA ELEMENT	DATA SET	INDICATOR	ORGANISATION UNIT	PROGRAM	VALIDATION	OTHER
	Program	<div>Program</div> <div>Create, modify and view programs. A program has program stages and defines which actions should be taken at each stage.</div> <div></div>	<div>Tracked entity attribute</div> <div>Create, modify and view tracked entity attributes. An attribute can be used to register extra information for a tracked entity.</div> <div></div>	<div>Relationship type</div> <div>Create, modify and view relationship types. A relationship is typically wife and husband or mother and child.</div> <div></div>	<div>Tracked entity</div> <div>Define types of entities which can be tracked through the system, which can be anything from persons to commodities.</div> <div></div>			
	Tracked entity attribute							
	Relationship type							
	Tracked entity							
	Program rule	<div>Program rule</div> <div>Program rules allow you to create and control dynamic behavior of the user interface in the Tracker Capture and Event Capture apps.</div> <div></div>	<div>Program rule variable</div> <div>Variables you use to create program rule expressions.</div> <div></div>					
	Program rule variable							

Remember to use your initials as a prefix when creating these objects to keep the names unique.

Add in a new program rule variable

Weight, data element in current event, Weight (in kg)

Program (*)

TB Treatment Card

.....

Name (*)

weight

☐ Use code for option set

Source type (*)

Data element in current event

Data element

Weight (in kg)

SAVE

CANCEL

Create the program rule

Provide the Program rule details

1

Enter program rule details

2

Enter program rule expression

3

Define program rule actions

Program (*)

TB Treatment Card

+

↺

Name (*)

Weight : out of range

Description

When the weight is out of a range and displays extreme values show a warning message

Priority

SAVE

CANCEL

In the expression, we combine several principles to create our output by using a custom function, the “AND” and “OR” logical operators as well as brackets to define the extreme ranges of the weight value. As weight is a numerical value, we can apply logic similar to a validation rule in order to determine which values we consider out of range.

1

Enter program rule details

2

Enter program rule expression

3

Define program rule actions

Condition

d2:hasValue('weight') && ({weight} <= 5 || {weight} >= 140)

+

-

*

/

%

>

>=

<

<=

==

!=

NOT

AND

OR

Variables

A(dateofbirth)

#(TBDiseaseSite)

#(weight)

Functions

SAVE

CANCEL

Provide the program rule action

Define program rule action

Action (*)

Show warning

Data element to display warning next to

Weight (in kg)

Tracked entity attribute to display warning next to

Static text

This weight value is likely <

Expression to evaluate and display after static text

+

-

*

/

%

>

>=

<

<=

==

!=

NOT

AND

OR

Variables

A{dateofbirth}

#{TBDiseaseSite}

#{weight}

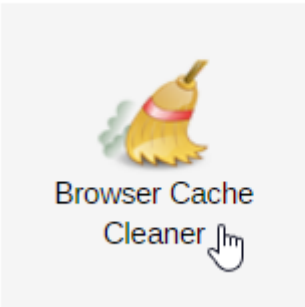
Functions

CANCEL

COMMIT

Test the program rule as before

Clear your browser cache by using the browser cache cleaner app



“Select all” -> Clear

Session Storage

SELECTED_OU	<input checked="" type="checkbox"/>
USER_PROFILE	<input checked="" type="checkbox"/>
USER_ROLES	<input checked="" type="checkbox"/>
ouSelected	<input checked="" type="checkbox"/>

Local Storage

SYSTEM_SETTING	<input checked="" type="checkbox"/>
dhis2.menu.ui.headerBar.link	<input checked="" type="checkbox"/>
dhis2.menu.ui.headerBar.logo	<input checked="" type="checkbox"/>
dhis2.menu.ui.headerBar.title	<input checked="" type="checkbox"/>
dhis2.menu.ui.headerBar.userStyle	<input checked="" type="checkbox"/>
ouRoots	<input checked="" type="checkbox"/>
ouUsername	<input checked="" type="checkbox"/>
ouVersion	<input checked="" type="checkbox"/>

IndexedDB

dhis2ou	<input checked="" type="checkbox"/>
dhis2tc	<input checked="" type="checkbox"/>

Clear

Unselect all

When the weight value is out of the range you have defined it should display a warning message.

GeneXpert Result	Select or search from the list
Weight (in kg)	180 This weight value is likely out of range. ×
Weight (in kg)	3 This weight value is likely out of range. ×

When the weight is within the range you have defined, or the weight data element has no value, no warning message should appear.

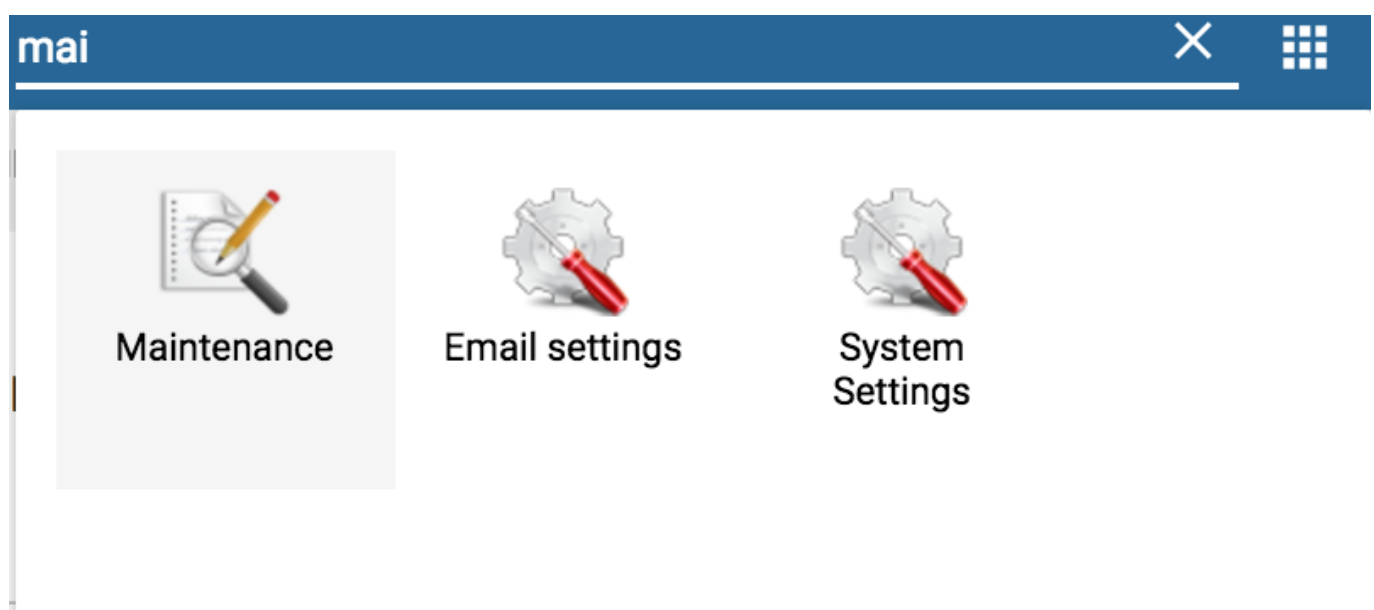
Weight (in kg)	89
Weight (in kg)	

Exercise 4 - Create a program rule that shows the TB disease site in the feedback

Show the disease site in the feedback widget

Access the Programs rules from Maintenance App ⇒ Program

Log into the blank instance and go to Maintenance App



and click on Program

ALL	CATEGORY	DATA ELEMENT	DATA SET	INDICATOR	ORGANISATION UNIT	PROGRAM	VALIDATION	OTHER
<div><div></div><div>Program</div></div>		<div><div>Program</div><div>Create, modify and view programs. A program has program stages and defines which actions should be taken at each stage.</div><div><div>+</div><div><div></div></div></div></div>		<div><div>Tracked entity attribute</div><div>Create, modify and view tracked entity attributes. An attribute can be used to register extra information for a tracked entity.</div><div><div>+</div><div><div></div></div></div></div>		<div><div>Relationship type</div><div>Create, modify and view relationship types. A relationship is typically wife and husband or mother and child.</div><div><div>+</div><div><div></div></div></div></div>		<div><div>Tracked entity</div><div>Define types of entities which can be tracked through the system, which can be anything from persons to commodities.</div><div><div>+</div><div><div></div></div></div></div>
<div><div></div><div>Tracked entity attribute</div></div>								
<div><div></div><div>Relationship type</div></div>								
<div><div></div><div>Tracked entity</div></div>								
<div><div></div><div>Program rule</div></div>		<div><div>Program rule</div><div>Program rules allow you to create and control dynamic behavior of the user interface in the Tracker Capture and Event Capture apps.</div><div><div>+</div><div><div></div></div></div></div>		<div><div>Program rule variable</div><div>Variables you use to create program rule expressions.</div><div><div>+</div><div><div></div></div></div></div>				
<div><div></div><div>Program rule variable</div></div>								

Remember to use your initials as a prefix when creating these objects to keep the names unique.

Add in a new program rule variable

Program (*)

TB Treatment Card

Name (*)

TBDiseaseSite_newest_event

☒

Use code for option set

Source type (*)

Data element from the newest event for a program stage

Program Stage

Initial Diagnosis

Data element

TBTC|TB Disease Site

SAVE

CANCEL

We want to see the disease site regardless of what stage we are viewing in tracker capture. The disease site is only captured in the initial stage, so we want to refer to it to display the necessary information in the widget. This is an example of when we can use a different source field than we have so far.

Create the new rule

1

Enter program rule details

2

Enter program rule expression

3

Define program rule actions

Program (*)

TB Treatment Card

+

↺

Trigger rule only for program stage

Name (*)

Show TB Disease Site in Feedback

Description

Show TB Disease Site in Feedback

Priority

SAVE

CANCEL

Create and explain the expression. We will use a function called d2:hasValue to check if there is any value for the data element

1

Enter program rule details

2

Enter program rule expression

3

Define program rule actions

Condition

d2:hasValue("#{TBDiseaseSite_newest_event}")

+ - * / % > >= < <= == !=

NOT AND OR

✓ TB Disease Site

▪ Built in variables

▪ Variables

A{dateofbirth}

#{TBDiseaseSite_current}

#{TBDiseaseSite_newest_event}

#{weight}

▪ Functions

Define the action

Define program rule action

Action (*)

Display text

Display widget (*)

Feedback widget

Static text

TB Disease Site

Expression to evaluate and display after static text

```
# {TBDiseaseSite_newest_event}
```

- Built in variables
- Variables
- Functions

+ - * / %

> >= < <= == !=

NOT AND OR

For the action, we will display the value that was collected in the feedback widget. We can then add this to the top bar.

Test the rule. Clear cache if necessary

TB Registration Number : 69525075

First Name : Lily

Last name : Ivy

Sex : Female

TB Disease Site : Pulmonary

Exercise 5 - Create another program rule for the TB Treatment Card to Assign Age based on the date of birth

Access the Programs rules from Maintenance App ⇒ Program

****Log into the blank instance and go to Maintenance App ****



Add in a new program rule variable

Program rule variable "dateofbirth" with "Tracked entity attribute" source type

22 / 27

Create the program rule

Provide the Program rule details

← Program rule

1 Enter program rule details

2 Enter program rule expression

3 Define program rule actions

Program (*)

TB Treatment Card

Name (*)

TB Patient Age

Description

Priority

SAVE

CANCEL

In the expression, we will use a numerical function. You can point the participants to the documentation for a full listing of custom functions available to the user, as the other will not be covered in detail here. This is rather to give them an idea of what is possible with these functions.

← Program rule

1 Enter program rule details

2 Enter program rule expression

3 Define program rule actions

Condition

d2.hasValue('dateofbirth')

+

-

*

/

%

>

>=

<

<=

==

!=

NOT

AND

OR

Variables

A(dateofbirth)

#(DiseaseSite)

Functions

SAVE

CANCEL

Provide the program rule action

23 / 27

Define program rule action

Action (*)

Assign value

Data element to assign to

Tracked entity attribute to assign to

Age

Program rule variable to assign to

Expression to evaluate and assign

d2:yearsBetween(A{dateofbirth}, V{current_date})

+

-

*

/

%

>

>=

<

<=

==

!=

NOT

AND

OR

Variables

A{dateofbirth}

#{DiseaseSite}

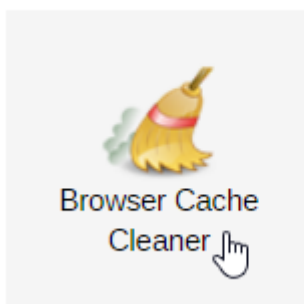
Functions

CANCEL

COMMIT

Test the program rule as before

Clear your browser cache by using the browser cache cleaner app



"Select all" -> Clear

Session Storage

SELECTED_OU	<input checked="" type="checkbox"/>
USER_PROFILE	<input checked="" type="checkbox"/>
USER_ROLES	<input checked="" type="checkbox"/>
ouSelected	<input checked="" type="checkbox"/>

Local Storage

SYSTEM_SETTING	<input checked="" type="checkbox"/>
dhis2.menu.ui.headerBar.link	<input checked="" type="checkbox"/>
dhis2.menu.ui.headerBar.logo	<input checked="" type="checkbox"/>
dhis2.menu.ui.headerBar.title	<input checked="" type="checkbox"/>
dhis2.menu.ui.headerBar.userStyle	<input checked="" type="checkbox"/>
ouRoots	<input checked="" type="checkbox"/>
ouUsername	<input checked="" type="checkbox"/>
ouVersion	<input checked="" type="checkbox"/>

IndexedDB

dhis2ou	<input checked="" type="checkbox"/>
dhis2tc	<input checked="" type="checkbox"/>

Clear

Unselect all

Register a new entity and enter the date of Birth

Enrollment

Enrolling organisation unit	Parrot District Hospital
Report Date	2017-06-13

Profile

TB Registration Number	34868601
Date of Birth	yyyy-MM-dd
First Name	
Last name	
Age	
Sex *	
Family Address	
Phone number	

<Prev

Today

Next>

June

1990

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Clear

Close

Save and continue

Save and add new

Print form

Cancel

After entering the Date of Birth, Age will be calculated

Date of Birth	<input type="text" value="1990-06-13"/>
First Name	<input type="text"/>
Last name	<input type="text"/>
Age	<input type="text" value="27"/>
Sex *	<div><div>Select or search from the list</div><div>▼</div></div>