How to specify loop iterations for specific paths in a loop

version	1.0.1
scope	Example. This code is provided as example code for a user to base their code on.
description	How to specify loop iterations for specific paths in a loop
boards	Unless otherwise specified, this example runs on the SliceKIT Core Board, but can easily be run on any XMOS device by using a different XN file.

A loop may contain multiple paths through it. When a loop iteration count has been set the tool assumes that all iterations will take the worst-case path of execution through the loop. This is not always the case, and a more realistic worst-case can be established by specifying the number of iterations on individual paths through the loop.

For example, compile the following code:

```
int f() {
  int x = 0;
  for (unsigned int i = 0; i < 10; ++i) {
    #pragma xta label "loop_label"
    if ((i & 1) == 0) {
      #pragma xta label "if_label"
      ++x;
    }
  }
  return x;
}

int main() {
  f();
  return 0;
}
```

1   Setting global loop path iterations

Load the resulting executable into the XTA then click the 'Add define' button in the toolbar. In the dialog, On the *Loop* tab, enter 10 iterations using *loop_label* as the reference. Next switch to the *Loop Path* tab and enter 5 iterations using 'if_label' as the reference. Any future routes containing this loop will now correctly assign five iterations to each side of the conditional in the loop.

To add a global loop scope using the command line XTA, or from an XTA script/embedded source command, the following can be used:

```
add loop loop_label 10
add looppath if_label 5
```

2   Setting a local loop scope

Load the resulting executable into the XTA then time the function 'f'. This will create the route. Right-click in the left hand side border of the editor on the source line inside the conditional (++x) and select 'Set loop iterations'. In the resulting dialog, set the number of iterations to 10. Now right-click on the same line and select 'Set loop path iterations', and this time enter 5 in the dialog.

To add a local loop scope using the command line XTA, or from an XTA script/embedded source command, the following can be used:

```
set loop 0 loop_label 10
set looppath 0 if_label 5
```

This will set a the loop iterations for the route with an id of 0.

Note: There are some rules that need to be followed when setting loop path iterations:

▶ In a nested loop, the outer loop iterations need to be set first.

▶ The sum of the loop path iterations set must be less than or equal to the loop iterations set on the enclosing loop.

▶ If the loop path iterations set are less than that of the enclosing loop, then there must exist another path within the loop without its iterations set to which the remaining iterations can be allocated.

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