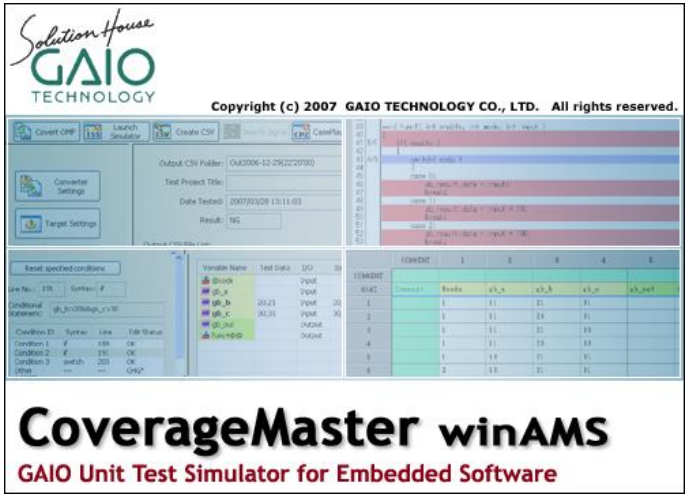
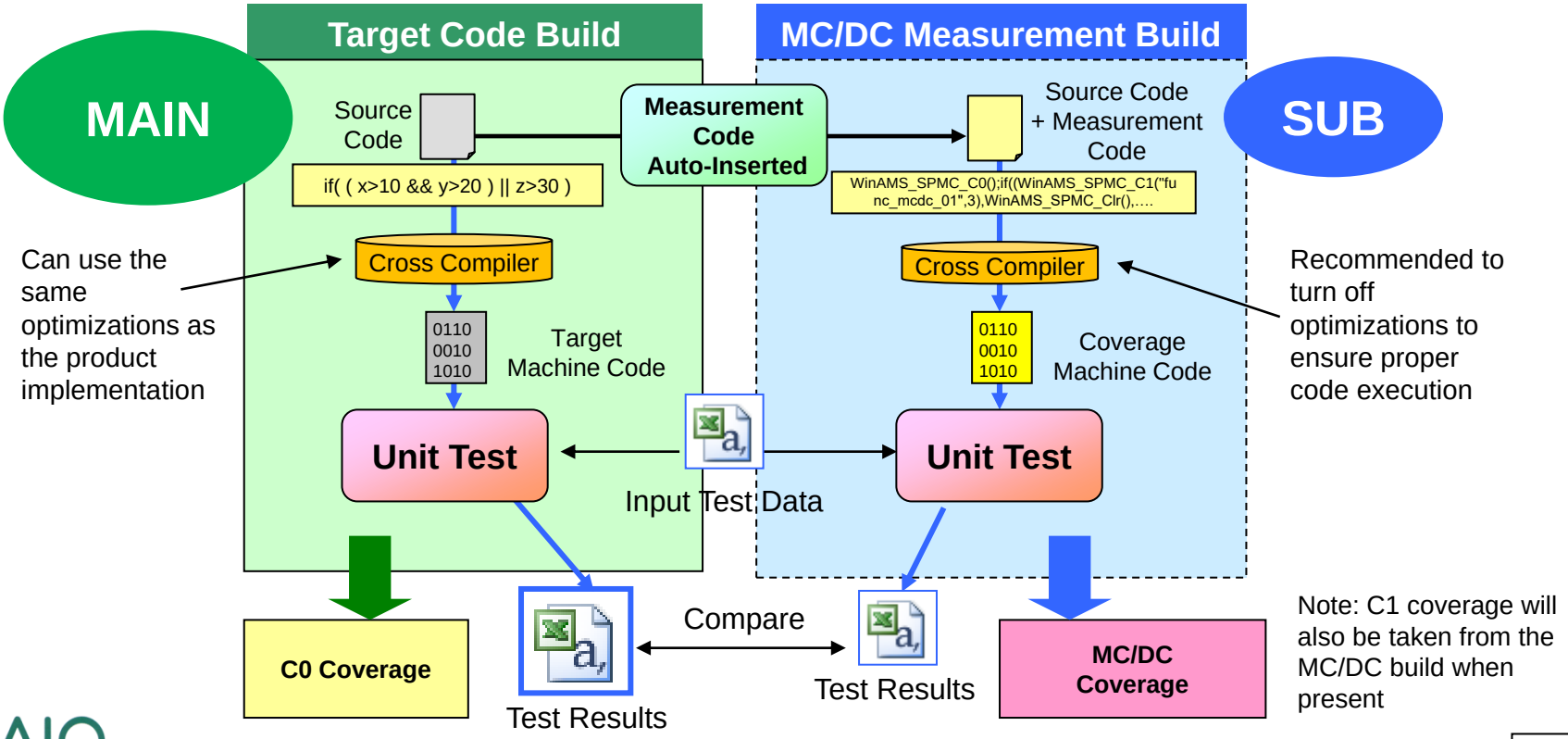
CoverageMaster winAMS - Coverage Measurement Hook Code (MC/DC) Setup Guide



GAIO TECHNOLOGY

How MC/DC is Measured

- **In order to measure MC/DC, the test is run twice**
  - Main run: the unit test results are acquired from the unmodified target source code and compared with the expected results
  - Sub run: coverage measurement code inserted into the source code is used for measuring coverage
  - The results of the two executions are compared for accuracy



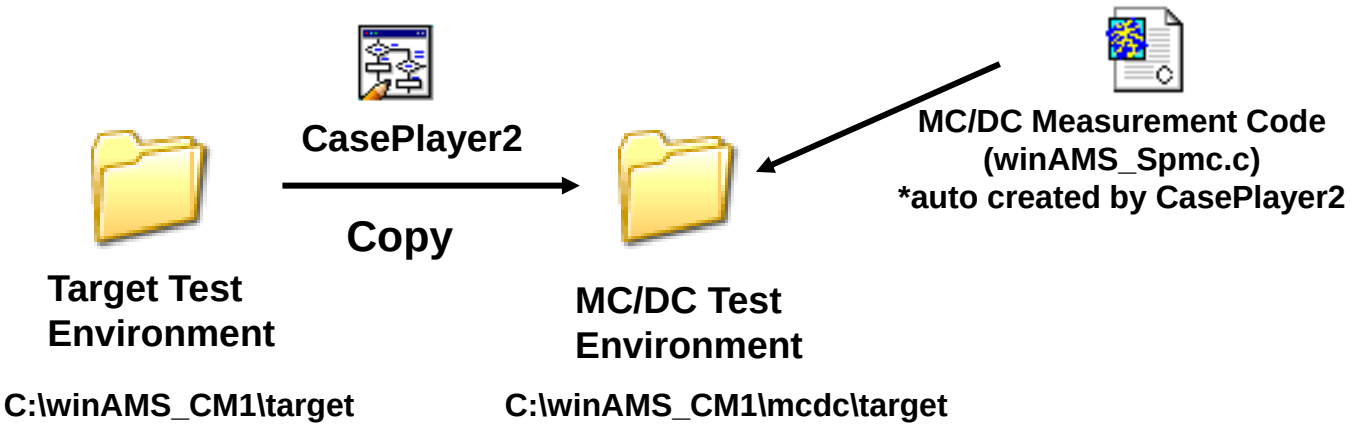
MC/DC Testing Setup Outline

MC/DC test environment setup procedure

A full copy of the target test environment including the build project and source files will be made and then configured for MC/DC testing.

1. Create a copy of the test environment using CasePlayer2
   - CasePlayer2 will auto insert the necessary MC/DC measurement code into the copied MC/DC test environment source files.
2. Add the MC/DC measurement code file (winAMS_Spmc.c) to the MC/DC test environment's build project and rebuild
3. Enable CoverageMaster MC/DC test settings

**Note: the CoverageMaster tutorial test environment is used an example for this document. Replace path locations with your project paths if different.*



Copy the target build environment

Copy the target build environment

1. From the SSTManager main screen click the **Target Settings** button
   - Click the **Setup object file with hook code** button
     (CasePlayer2 opens the **Setup Object File with Hook Code** dialog)
2. Select target object build environment folder: **C:\winAMS_CM1\target**
3. Select object with hook code build environment folder: **C:\winAMS_CM1\mcdc**
   (To create a new folder: select the project folder (**C:\winAMS_CM1\)**, click the **New** button, then name the folder as **mcdc**)
4. Click the **Set** button (with both original and new build environment folders selected)

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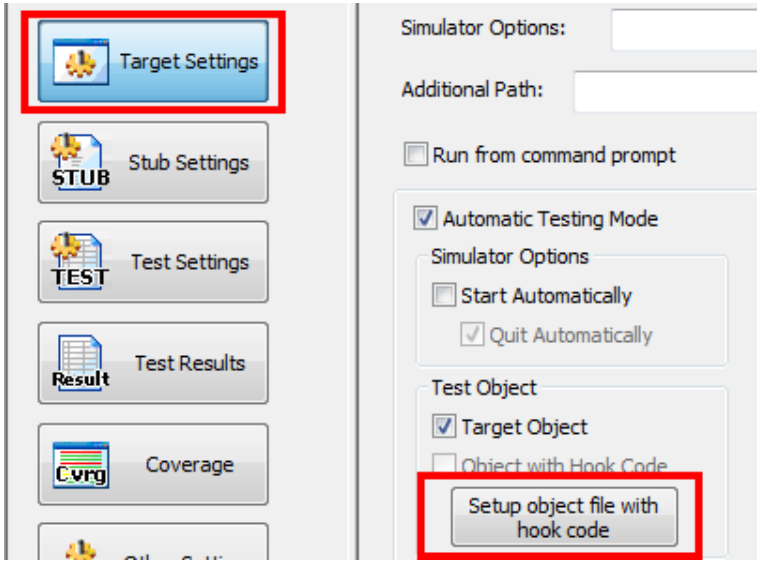
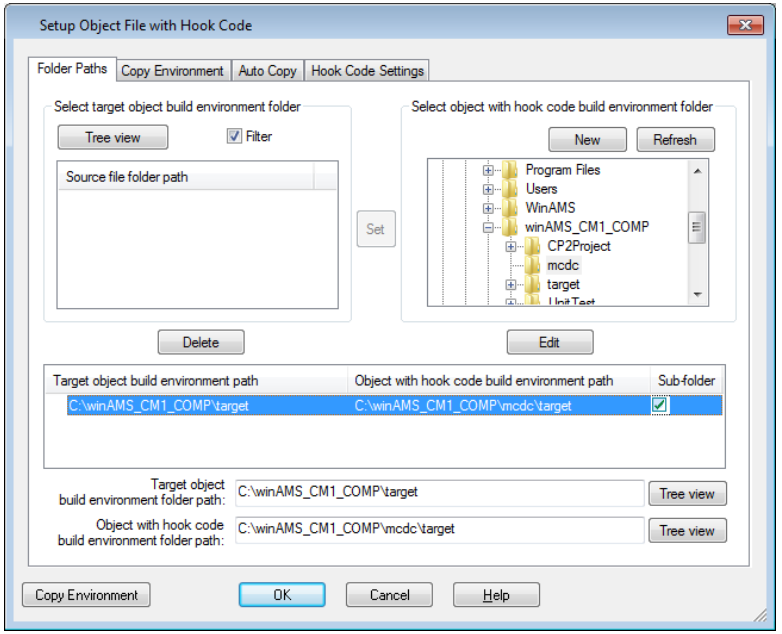
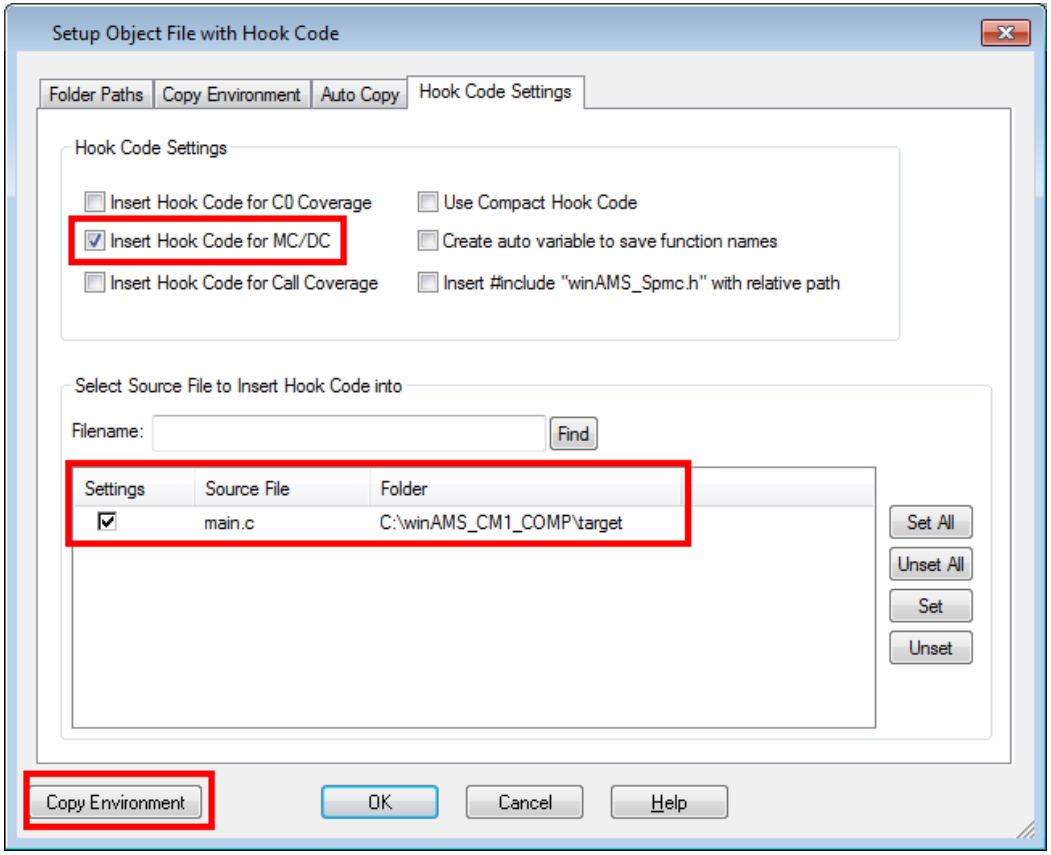




Copy the target build environment (cont.)

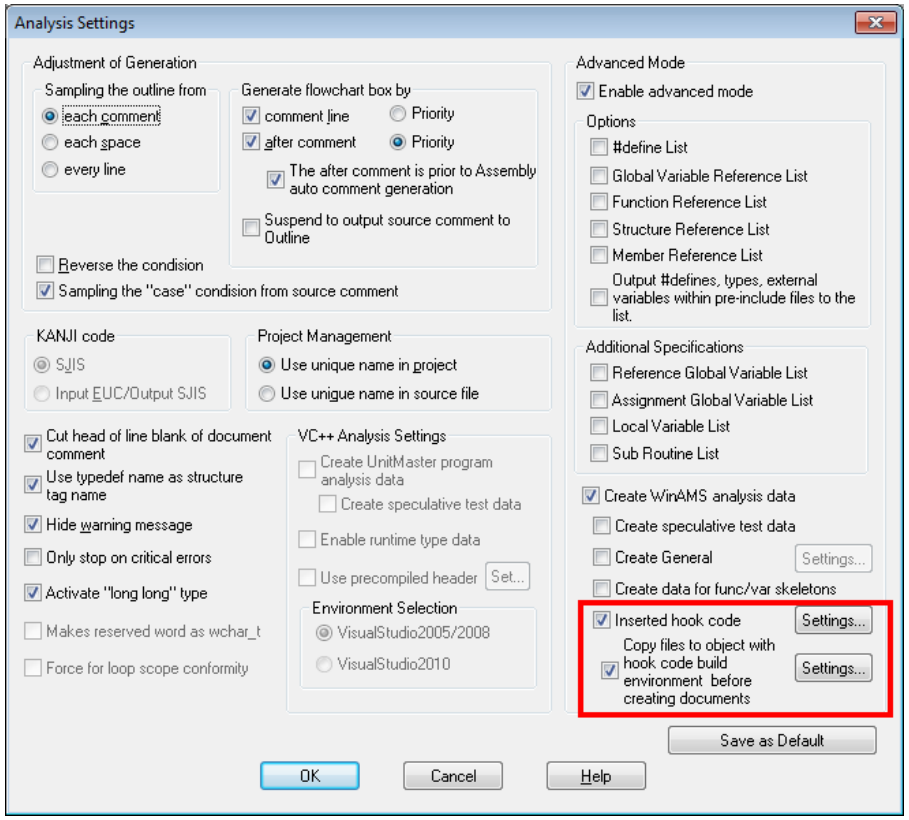
- **Copy the target build environment (continued)**
  5. Click the **Hook Code Settings** tab, check the **Insert Hook Code for MC/DC** option
  6. Verify that the source files to insert hook code into (main.c in the tutorial example) are checked
  7. Click the **Copy Environment** button
     **Note: for large build environments this can take some time*



Insert coverage measurement hook code

Insert coverage measurement hook code

1. From CasePlayer2 - click the **Settings** tab – double-click on **Analysis Settings**
   - Verify that the **Inserted hook code** and **Copy files to object with hook code build environment before creating documents** options are checked
2. Click **OK** to close the dialog, continue on the next page



Insert coverage measurement hook code (cont.)

- **Insert coverage measurement hook code**
  1. From the CasePlayer2 menu click:
     Project - **Re-create all Documents**
     A. Coverage measurement hook code will be inserted into the MC/DC build environment folder's source files
     B. Additional .c & .h files for MC/DC measurement will appear in the MC/DC build environment folder (**C:\winAMS_CM1\mcdc\target**)

A

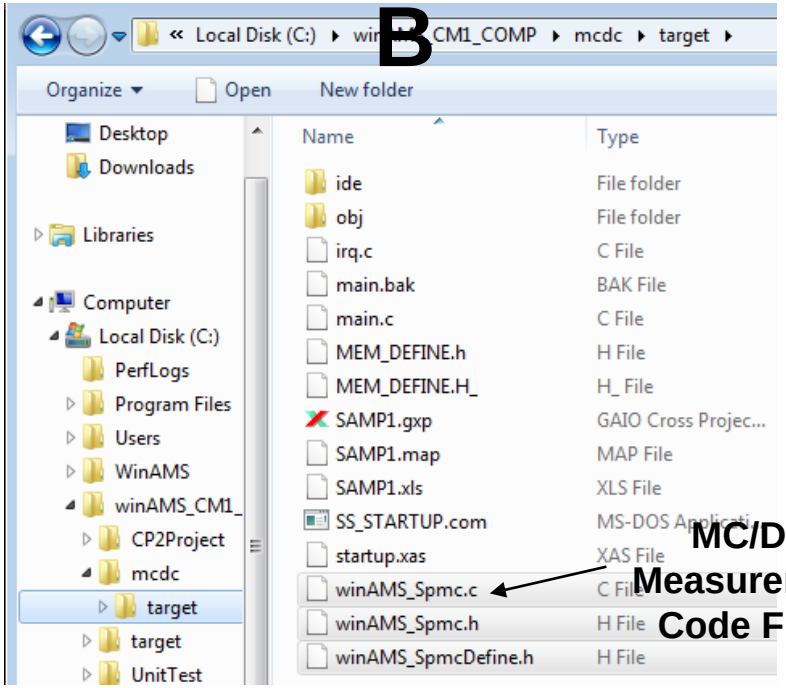
```
#include "winAMS_Spmc.h"

#line 9 "C:¥¥winAMS_CM1_COMP¥¥target¥¥main.c"
unsigned int *IRQ_COUNT = 0x04000000;
unsigned int *TIM_ENABLE = 0x04000004;
#line 12
void main()
{
#line 15
}
#line 27
struct ST_PARAM
{
int data;
int ret_code;
} gb_result;
#line 33
void func1( int enable, int mode, int input )
{
if((WinAMS_SPMC_C1("func1",3),WinAMS_SPMC_CIr(1),
{
 WinAMS_SPMC_C1("func1",5);switch( mode )
```

main.c with coverage measurement hook code.

Verify that measurement hook code was inserted into your source files.

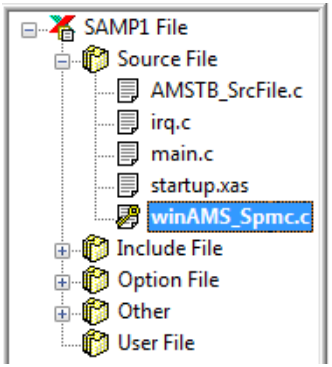
B



MC/DC Measurement Code Files

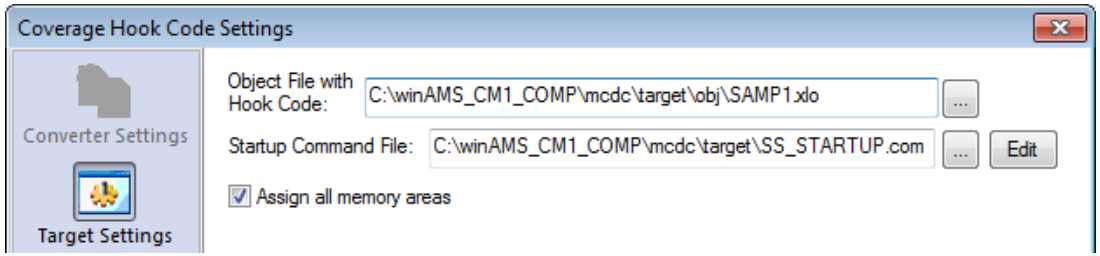
Build the MC/DC Object File

- **Add the MC/DC measurement code file (winAMS_Spmc.c) to the MC/DC test environment build project and rebuild**
  1. Double-click **SAMP1.gxp** found in **C:\winAMS_CM1\mcdc\target**
     (for tutorial users using GAIO's cross compiler)
     **Note: for users using other compilers, you need to open the MC/DC build environment and build using your cross compiler*
     1. From the GAIO Framework menu click:
        File - **Register File in Project**
        Select **C:\winAMS_CM1\mcdc\target\winAMS_Spmc.c**, click **OK**.
        Note: if a message was displayed stating that AMSTB_SrcFile.c is missing, remove the file from the project (using the right-click menu), then re-add* ***C:\winAMS_CM1\UnitTest\AMSTB_SrcFile.c*
     2. From the GAIO Framework menu click: **Build** - **Rebuild**



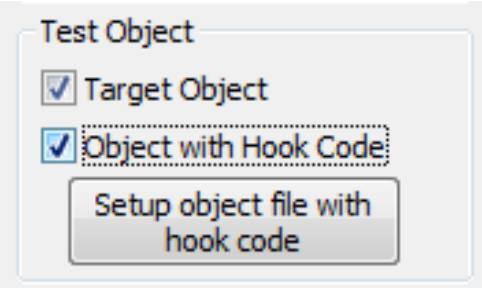
Register the MC/DC Object File for Testing

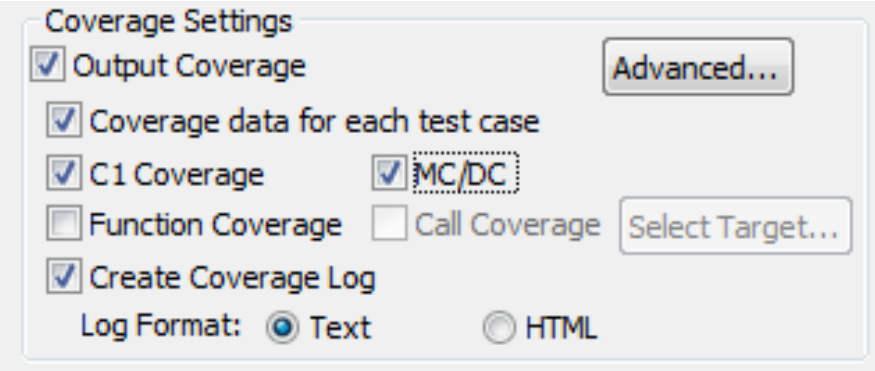
- **Register the MC/DC test object in CoverageMaster (SSTManager)**
  1. From the SSTManager main screen click the **Coverage Hook Code Settings** button (the dialog will appear).
     1. Target Settings - Object File with Hook Code:
        C:\winAMS_CM1\mcdc\target\obj\SAMP1.xlo
        (for tutorial users using GAIO's cross compiler)
        **Note: for users using other compilers, you need to register the object file in Converter Settings – Input Object and then OMF Convert*
     2. Target Settings - Startup Command File:
        C:\winAMS_CM1\mcdc\target\SS_STARTUP.com
        *******Note: in order to increase simulation speed, the* `set trace` *line in the startup command file should be commented out or removed. Refer to Exercise 1 in the tutorial for additional information.*
     3. Check the Target Settings - **Assign all memory areas** box
     4. Click **OK**



Enable MC/DC Settings

- **Enable MC/DC settings in CoverageMaster (SSTManager)**
  1. From the SSTManager main screen click the **Target Settings** button
     - Under the **Test Object** section, check the **Object with hook code** box (leave **Target Object** box checked as well)
  2. From the SSTManager main screen click the **Test Settings** button
     - Under the **Coverage Settings** section, check the **MC/DC** box



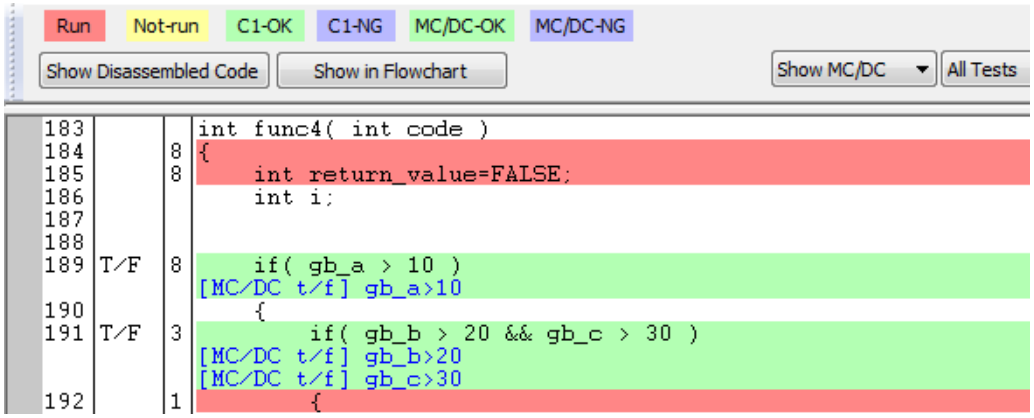


MC/DC Test Results

Start the test

1. From the SSTManager main screen click the **Start Simulator** button
   - The simulator will run twice for each test CSV file (one for the target object, and again for the Object with Hook Code)
2. From SSTManager main screen click the **Coverage** button in order to view the coverage results

Function	C0	C1	MC/DC
func1	100%	100%	100%
func2	100%	100%	100%
func3	100%	100%	100%
func4	100%	100%	100%



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For more information visit https://www.en.gaio.co.jp/

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