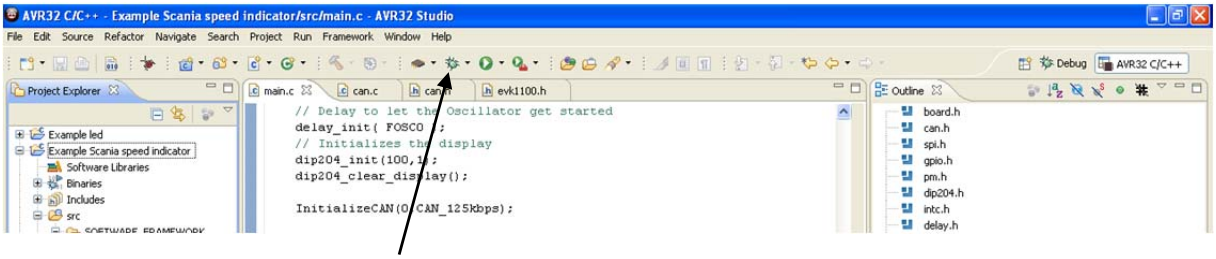
Debugging in AVR32 Studio

Debugging is a very powerful tool if you want to have a deeper look into your program. You can look at both variables and register values and check they are correct. In AVR32 Studio this can be done in this way.

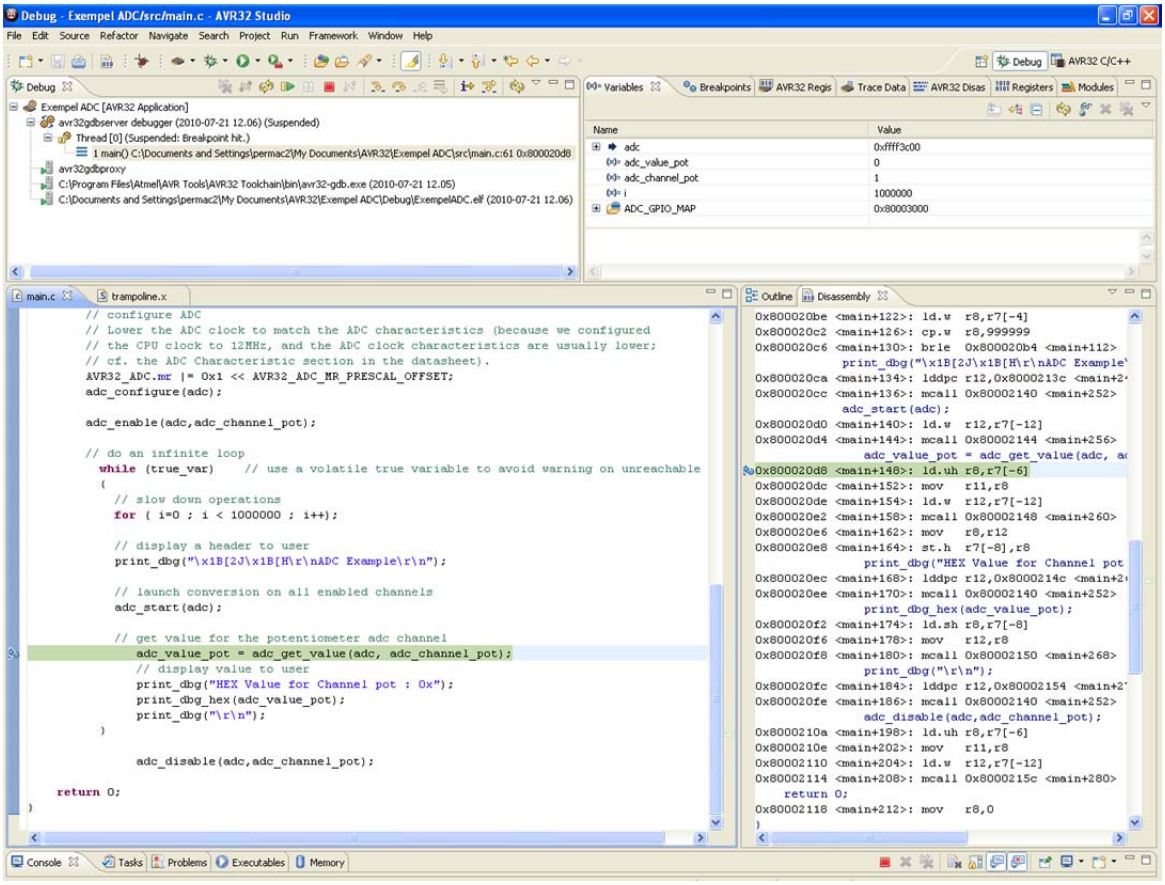
Step 1

In AVR32 studio, click on Debug. The perspective is changed into Debug mode. You can also change the perspective view between “Debug” and “AVR32 C/C++” up in the right upper corner of the screen.



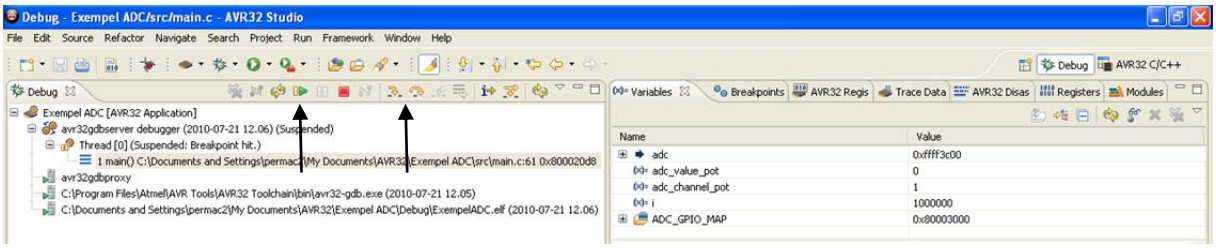
Step 2

Now we will change into the Debugging perspective. The program automatically stops at main. Now you can add breakpoints in your code by simply clicking on the left side. Here is the Example ADC used and a breakpoint has been set at “adc_value_pot”.



Step 3

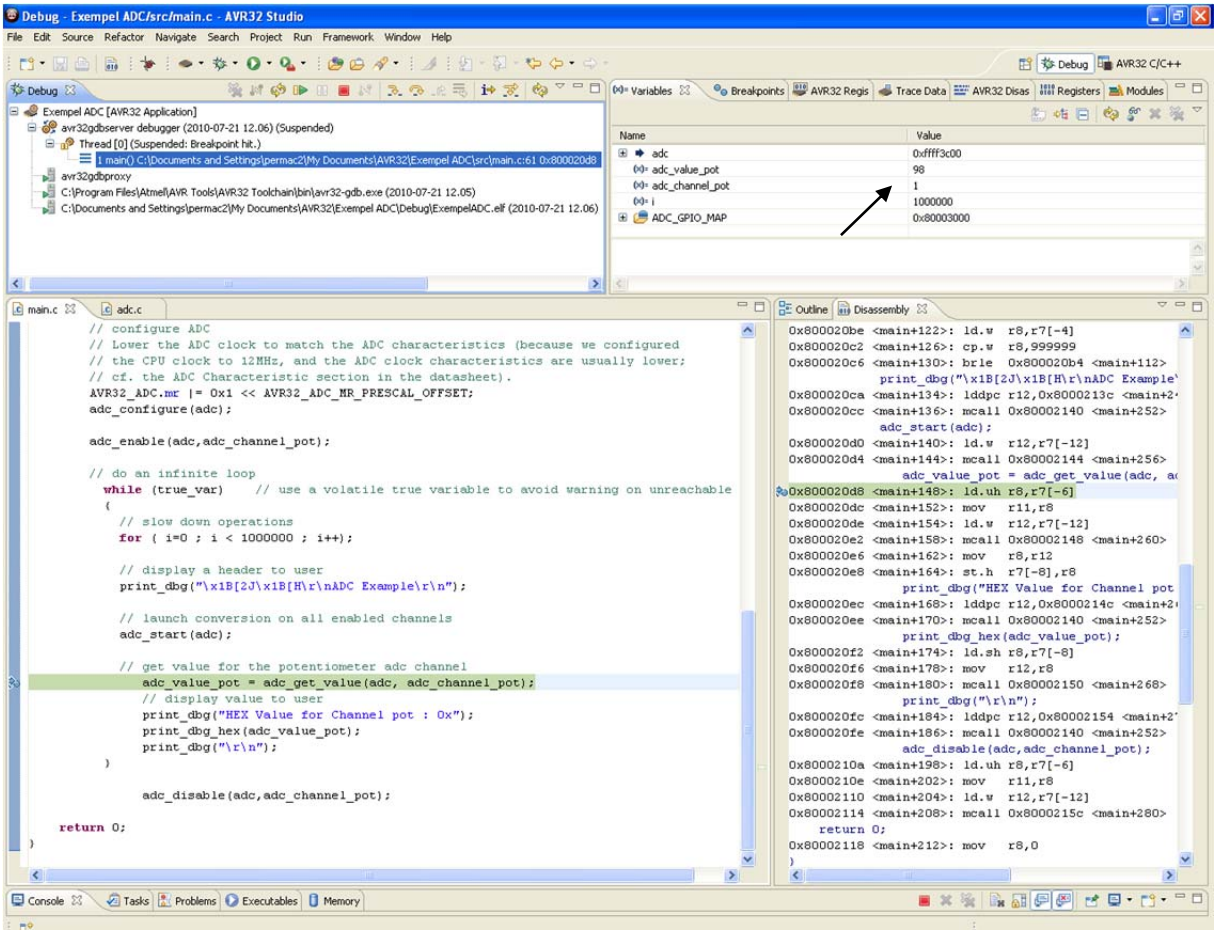
Now you can choose to resume your program or stepping through it. This can be done by clicking on “Resume” or “Step Into” or “Step Over”. If you chose “Resume” the program will run and just halt at your breakpoints. If you chose “Step Into” and “Step Over” you can follow and see how the whole program is working.



Step 4

Now if we turn the potentiometer and after that presses “Resume”, we can see that the “adc_value_pot” has change from 0 to 98. This is a very useful tool and a great help when you want to find bugs in your program.

Embedded Systems for Mechatronics 1, MF2042
Tutorial – Debugging in AVR32 Studio
version 2011-10-04



Tracing data

Sometimes it can be very useful to trace data in your program. Here we are showing one example where USART data to the HyperTerminal are being traced. The tutorial is originally designed for the AVR ONE! Debugger and the EVK1101 board, but most of the steps are the same in this case. Some text will be marked with blue and if you click on it you will see the changes made. Some text will be marked with red and that is text that has been deleted. The tutorial will start on the next page.

Section 5

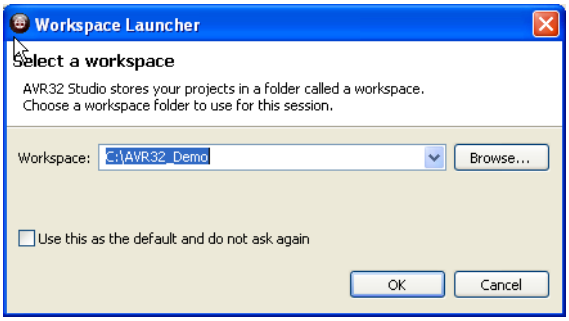
Create demo application

5.1 Start AVR32 Studio

Start AVR32 Studio. Start-up may take a while (because of all the Java libraries being loaded).

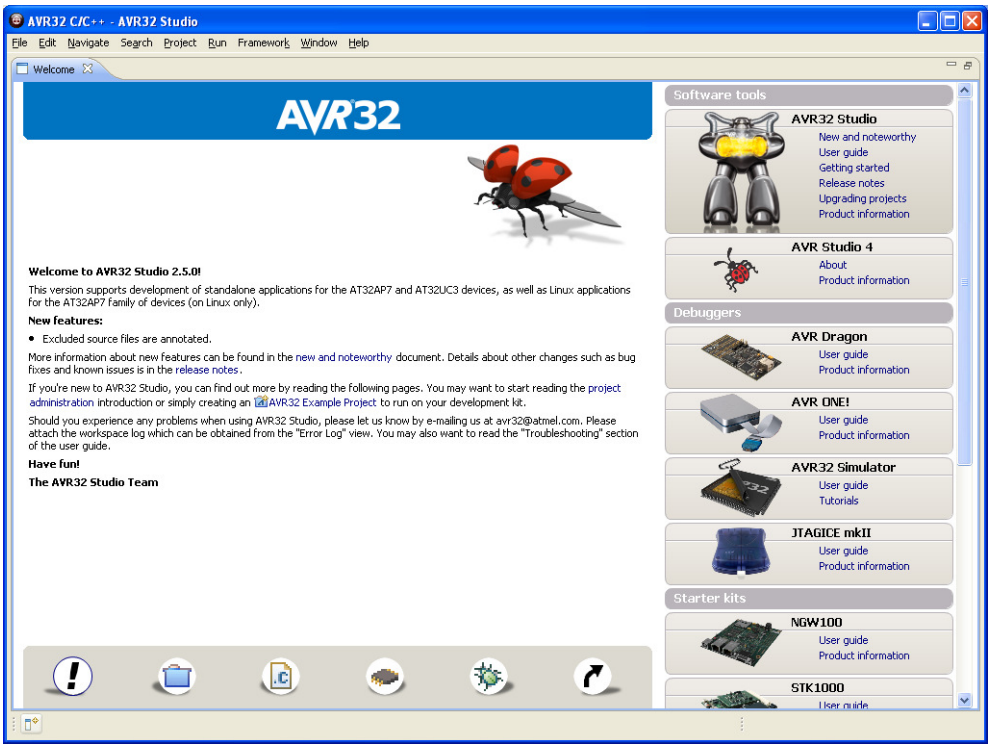
Figure 5-1. AVR32 Studio splash screen

Figure 5-2. AVR32 Studio workspace selection



Select a suitable workspace folder for your project files. If you want to use the same folder for your workspace every time you start AVR32 Studio, you should tick the box before clicking **OK**.

Figure 5-3. AVR32 Studio Welcome view



Exit from the welcome screen to the workbench by clicking on the **Close Page** icon (Arrow).

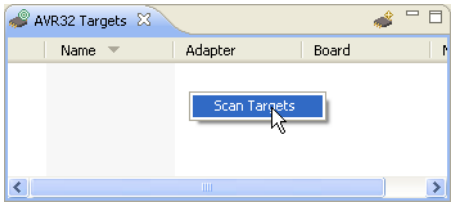
5.2 Configure adapter and target

Before you can use the ~~AVR ONE!~~ and the ~~EVK1101~~, you have to tell AVR32 Studio what type of equipment is connected to your PC.

“Target” refers to the MCU on the ~~EVK1101~~ evaluation board, and “Adapter” refers to the tool connecting the target to the PC (in this case, the ~~AVR ONE!~~).

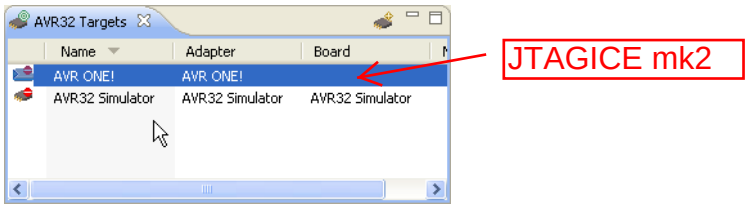
5.2.1 Add and configure the adapter ~~(AVR ONE!)~~

Figure 5-4. Scan Targets



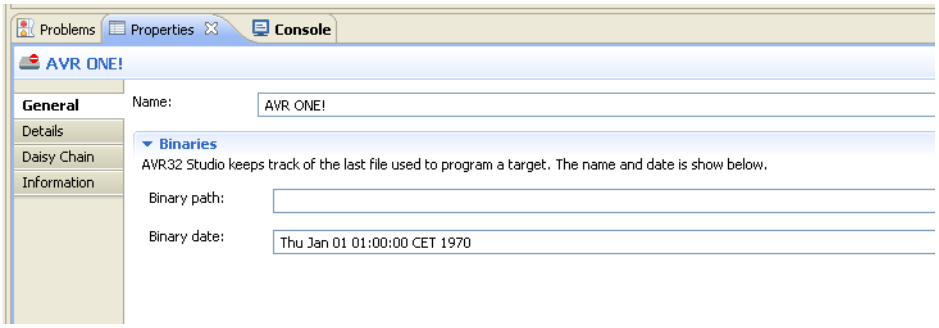
Right-click in the **AVR32 Target**-view and select **Scan Targets**.

Figure 5-5. Available targets



Select the ~~AVR ONE!~~

Figure 5-6. Selecting the properties view

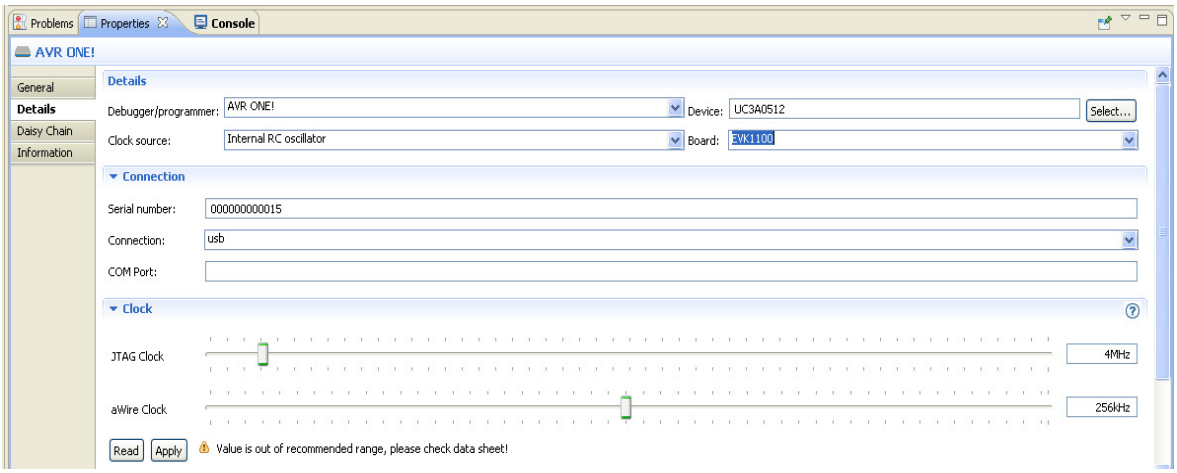


Click on the **Properties** tab.

You are now looking at the *Target* properties. If you have several adapters connected at the same time, this is the place where you can give them unique names. Just type the name you want to use in the **Name** field.

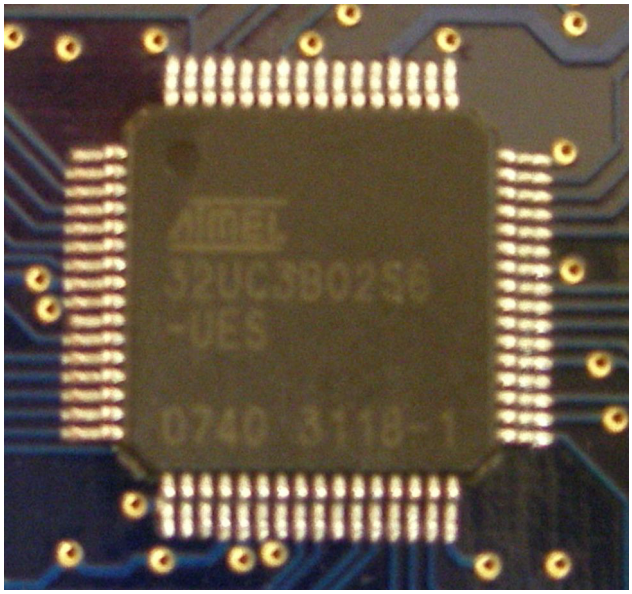
5.2.2 Configure target board and MCU

Figure 5-7. Details configuration tab



Set **Device** to **UC3B0256** or **UC3B0256ES**, depending on what MCU is installed on your EVK1101.

Figure 5-8. MCU Markings



To check which type of MCU is mounted on your EVK1101 evaluation board, you can read the part number printed on the MCU. The picture shows the part number printed on an -ES part (-UES suffix).

Set **Board** to **EVK1101**.

Set **MCU Clock source** to **Crystal** and adjust the JTAG Clock to a suitable value (Usually 33MHz or less. Max speed depends on target board signal quality). Click **Apply**.

The target and adapter configuration process is now complete.

5.2.3 Target MCU Chip erase

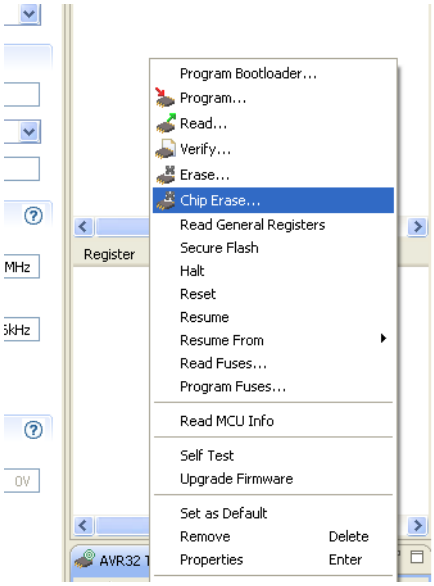
If the EVK1101 evaluation board is brand new, or if it still contains the original demo application (Control Panel Demo), the FLASH lock-bits need to be cleared. Right-click on the AVR ONE! In the *AVR32 Target* view and select **Chip Erase**.

WARNING! This process will erase the original demo application programmed at the factory. After this operation the EVK1101 evaluation board will be completely empty. If you need to keep the original application, you should not perform this operation.

If you would like to use your EVK1101 for this example, it is not difficult to restore the original “Control Panel Demo application”. All you have to do is to build the “Control Panel Demo example” enclosed with AVR32 Studio.

You should now perform the **Chip Erase** operation.

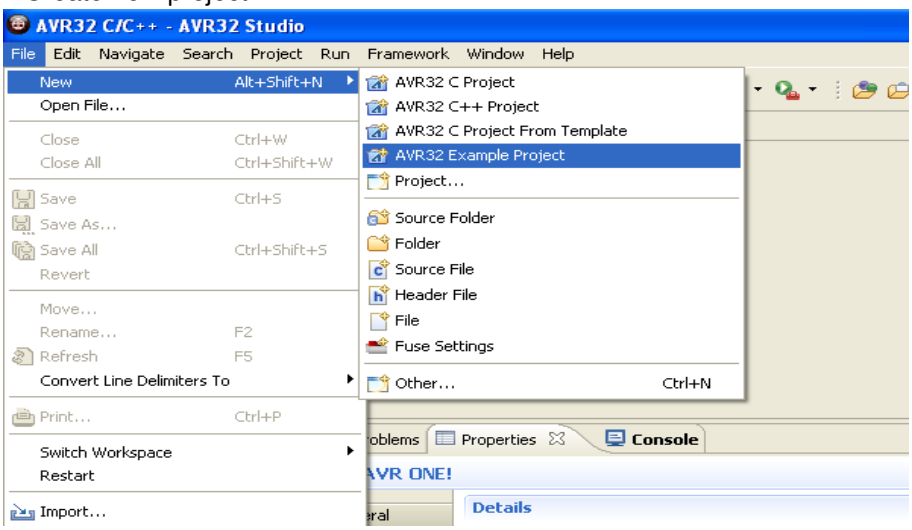
Figure 5-9. Chip erase operation



Right click on the target (AVR ONE!), and select **Chip Erase**.

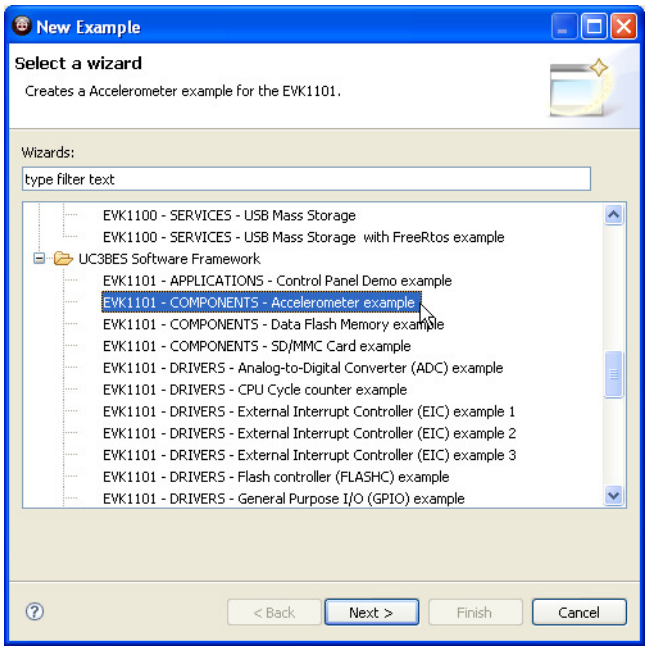
5.3 Create a demonstration project

Figure 5-10. Create new project



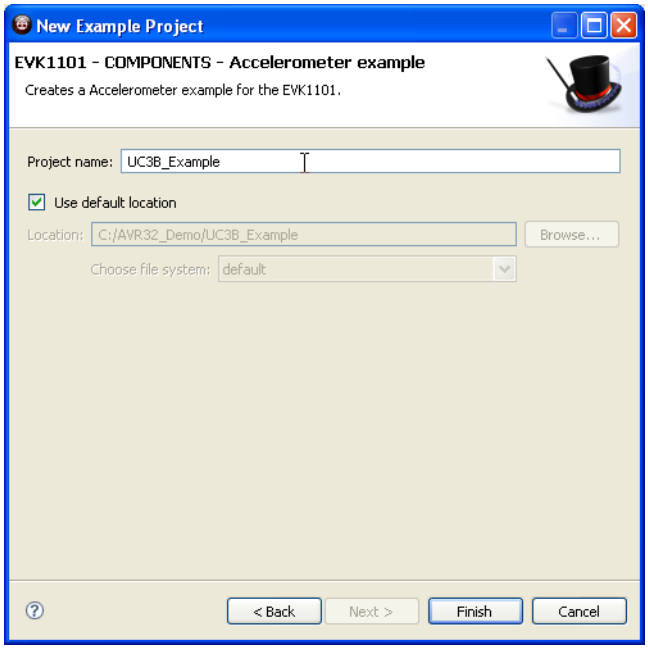
Create a new project by clicking *File>New>AVR32 Example Project.*

Figure 5-11. Select project example



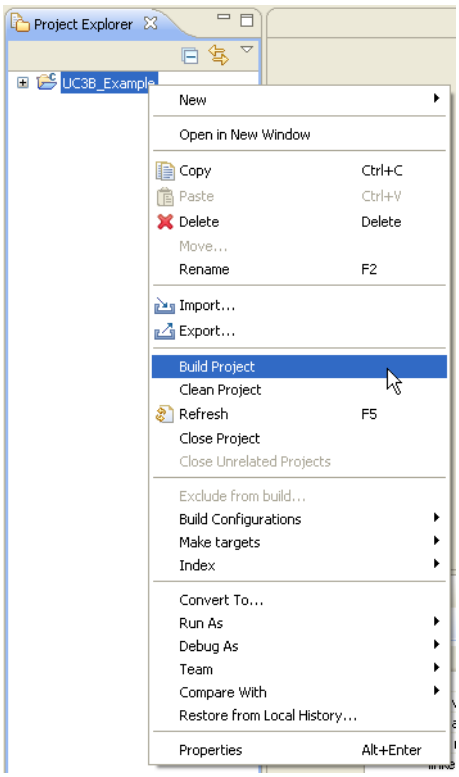
Select **EVK1101 – Components - ~~Accelerometer example~~**, then click **Next**

Figure 5-12. New project name



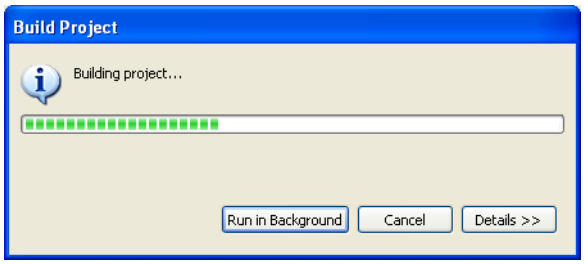
Enter a name for the project, and click **Finish**.

Figure 5-13. Build project



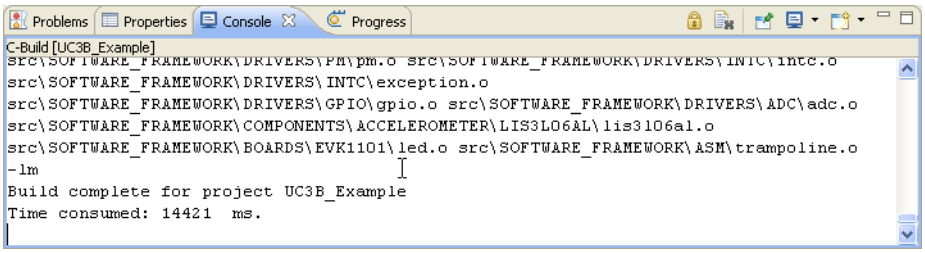
Right-click on the project in **Project Explorer**-view and select **Build Project** (or press CTRL+B).

Figure 5-14. Project build progress



Wait for the project build process to finish.

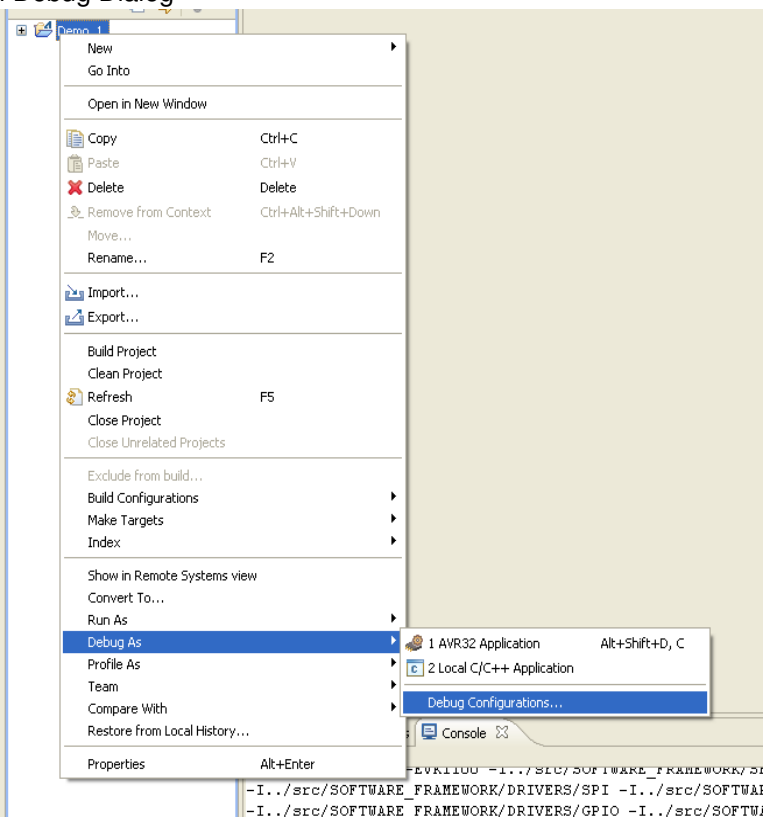
Figure 5-15. Console view



The console shows output from the compiler. Make sure that this ends with a “Build complete ...” message (Except for the “Time consumed” message). If something is not working, you will see error messages in this view.

5.4 Configure AVR32 Studio for a debug session using trace

Figure 5-16. Open Debug Dialog



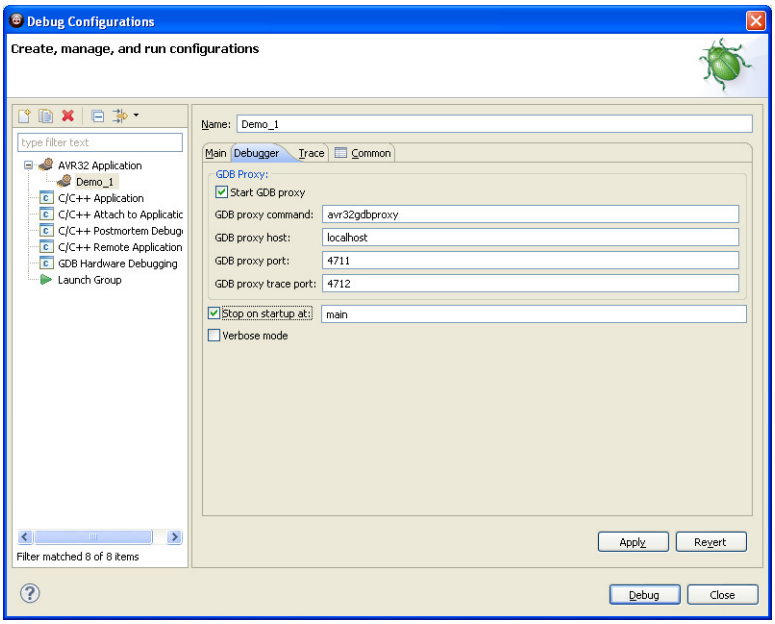
When the build process is finished, right-click on the project in the *Project Explorer* view and select *Debug As>Debug Configurations.*

5.4.1 Create a new debug launch configuration

In the *Debug Configurations* view, select **AVR32 Application** and right click and select **New**. A new launch configuration will be created and default values will be filled into all applicable fields.

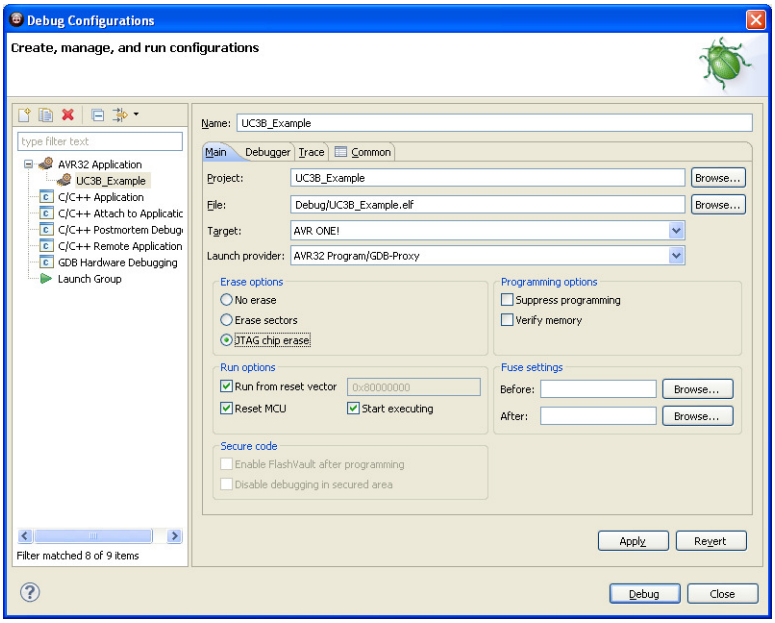
Select the *Debugger* tab and tick the **Stop on startup at: main** option.

Figure 5-17. **Debugger** tab



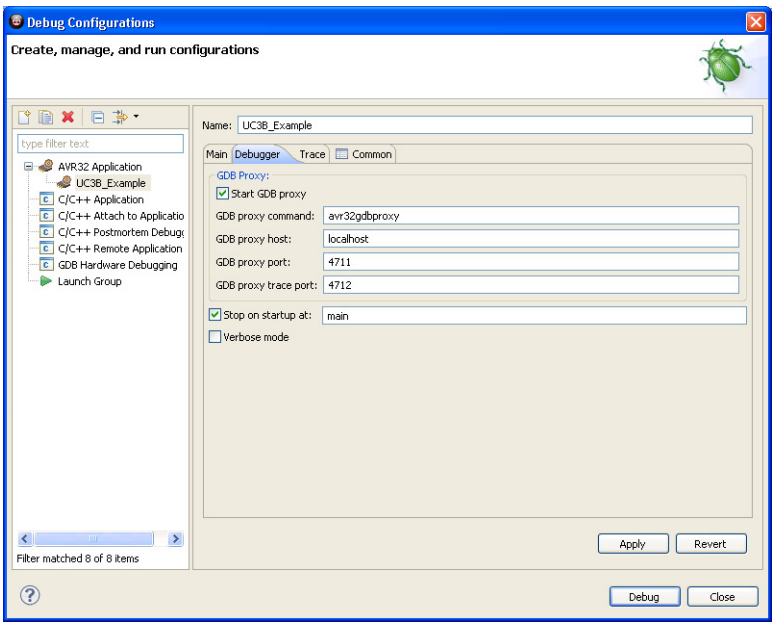
5.4.2 Configure the target trace module for program trace

Figure 5-18. Debug configurations, **Main** tab



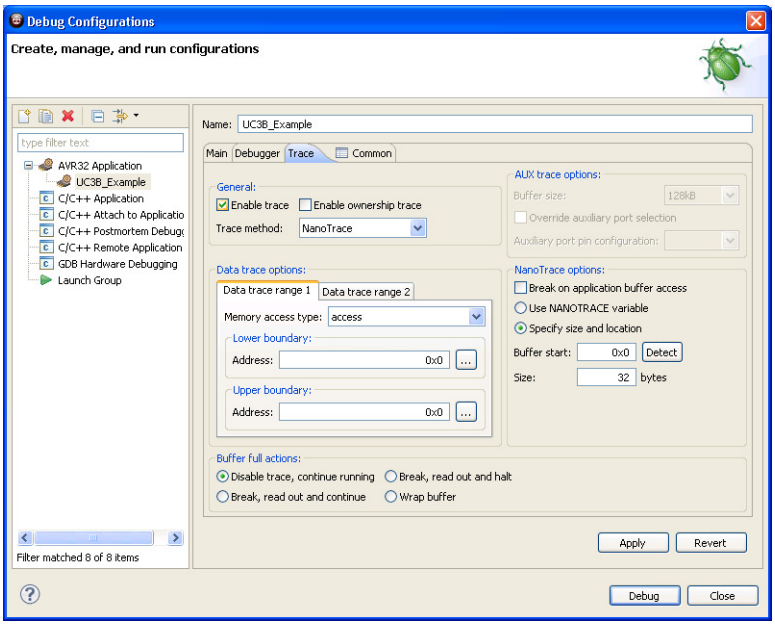
In the **Main** tab, make sure that *Target* is set to ***AVR ONE!***

Figure 5-19. Debug configurations, **Debugger** tab



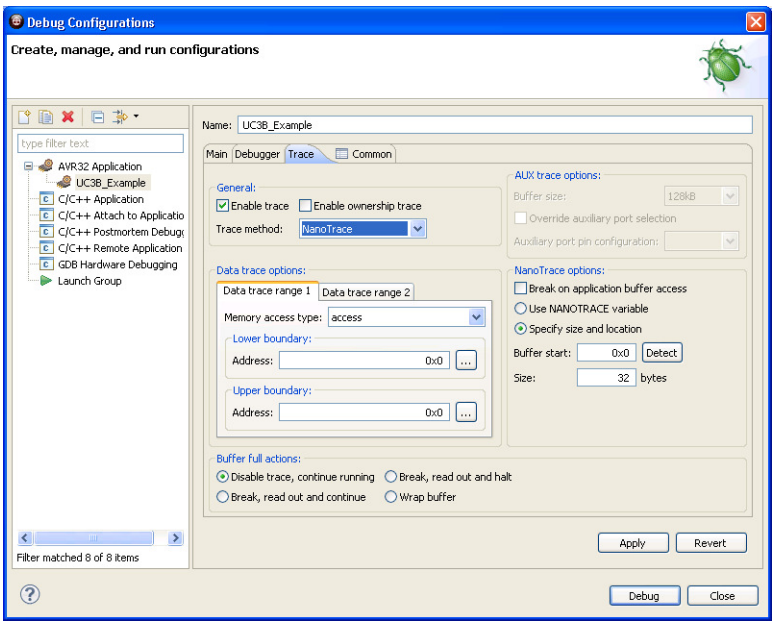
Select the **Debugger** tab and check the checkbox at the option **Stop on startup at: main**.

Figure 5-20. Enable Trace



Select the **Trace** tab and check **Enable Trace**.

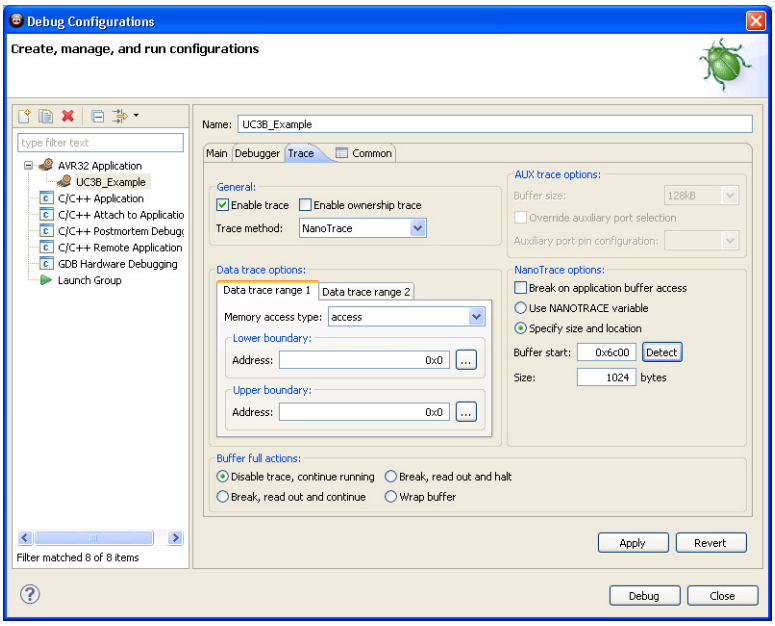
Figure 5-21. Preferred Trace method



Select the preferred trace method. In this case we want **Nano Trace**.

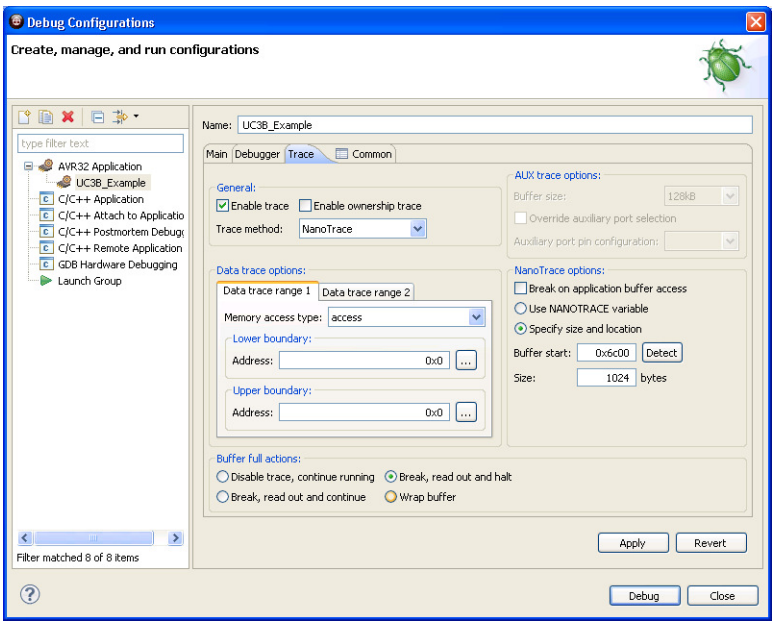
Deselect **Break on application buffer access**.

Figure 5-22. Trace buffer size



Select **Specify size and location** option. Then click **Detect** to configure trace buffer size and location.

Figure 5-23. Buffer full action

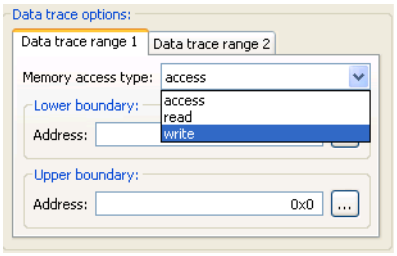


Selected the preferred action when buffer is full. In this case we choose **Break, read out and halt**.

5.4.3 Configure the target trace module for data trace

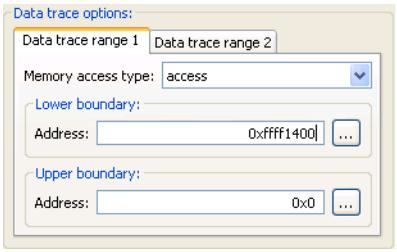
We would like to trace all data written to the debug UART. We do a quick lookup in the datasheet and find that the UART registers are located between 0xffff1400 and 0xffff1d00. Although we only use one UART in this application, we configure the data trace range to cover all UARTs.

Figure 5-24. Memory access type



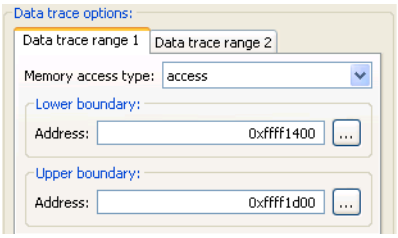
Set Memory access type to **write**.

Figure 5-25. Data trace lower boundary



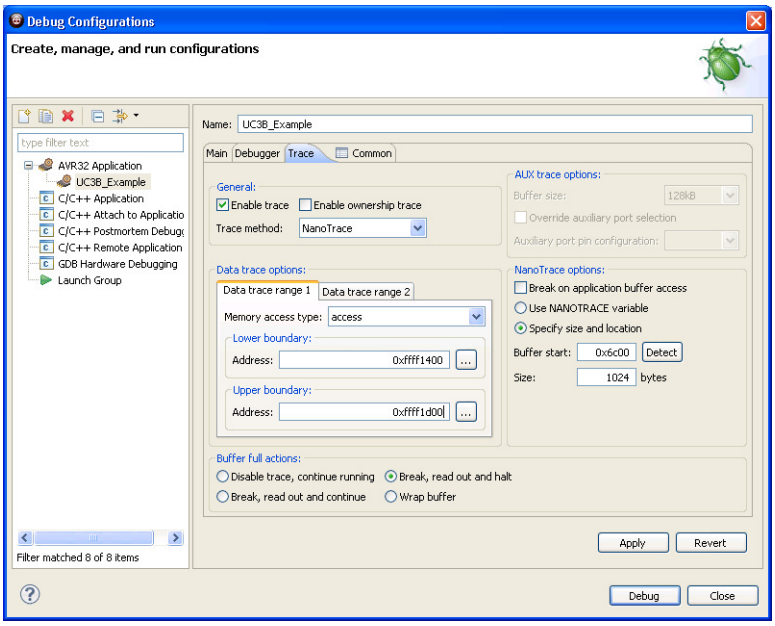
Set lower boundary to 0xffff1400.

Figure 5-26. Data trace upper boundary



Set upper boundary to 0xffff1d00.

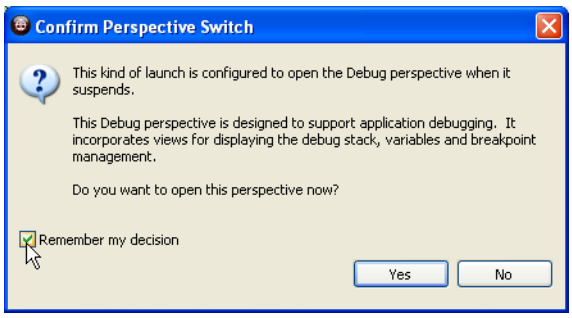
Figure 5-27. Configured trace



5.5 Start a debug session and configure the debugger for trace

Click the **Debug** button in the *Debug Confugurations* view. Now the program will be loaded into the target, and run until `main()`.

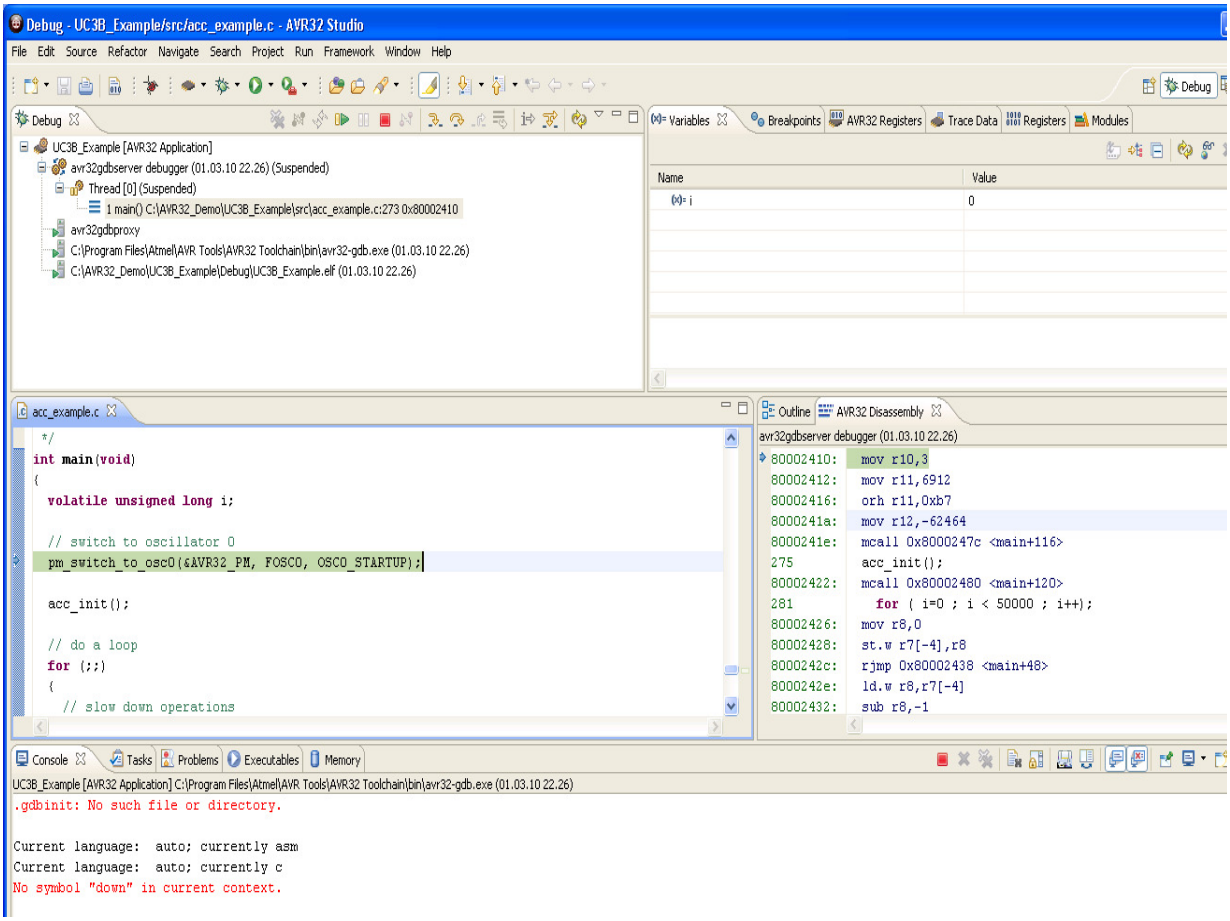
Figure 5-28. Switching perspective



When the debug session starts, AVR32 Studio 2.5 will change to the *Debug* perspective (desktop layout designed for use during debug sessions). You should click **Yes**. To avoid being asked every time you start a debug session, you should also click the **Remember my decision** box before answering **Yes**.

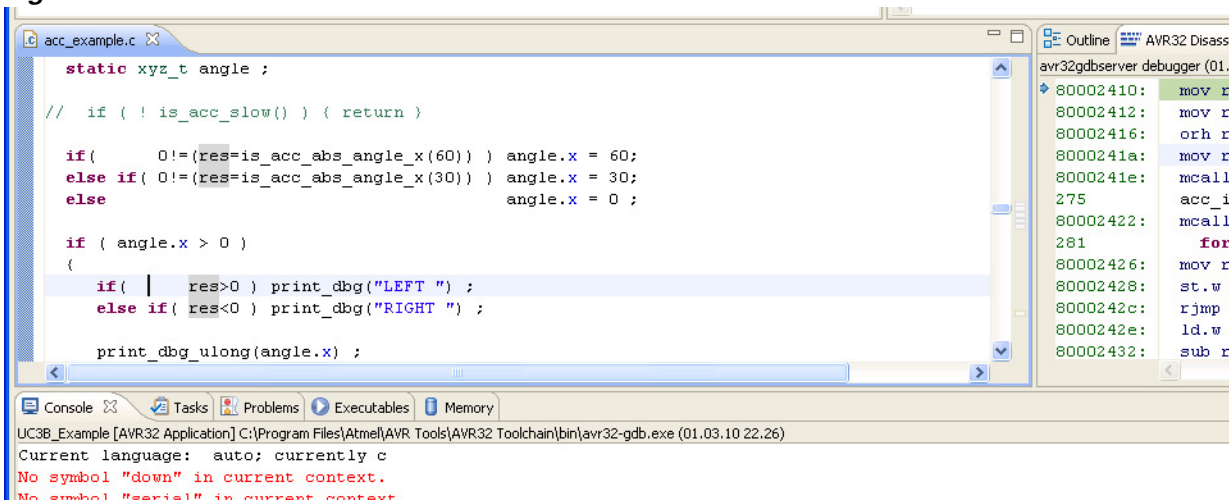
Wait until the target has stopped at the first instruction in the `main()` routine.

Figure 5-29. Program halted at `main()`



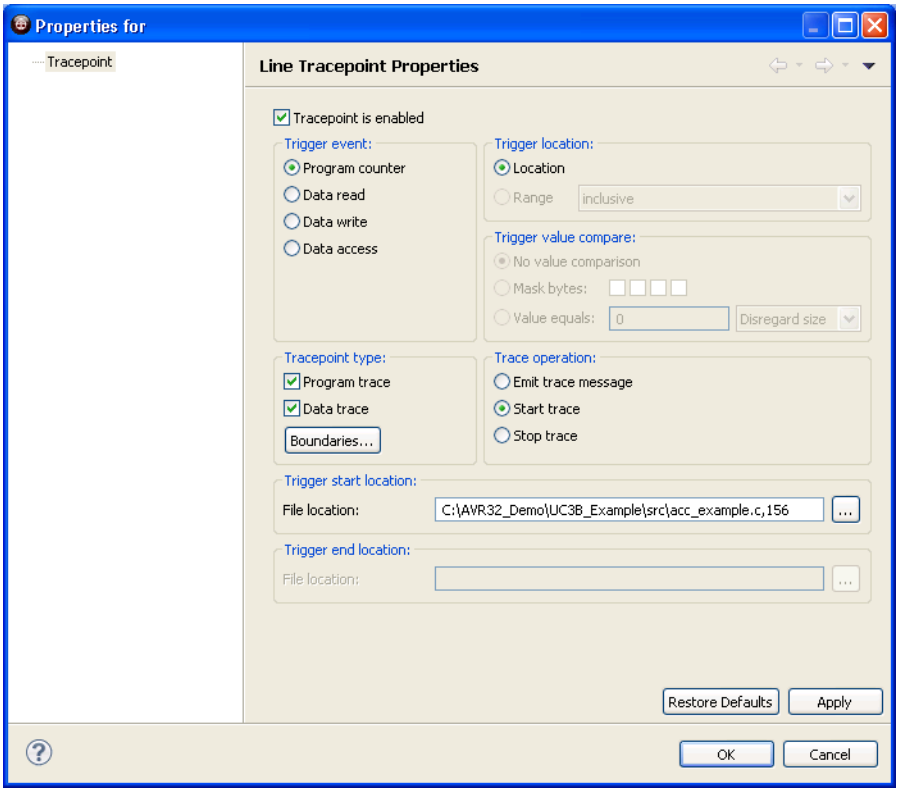
5.6 Add start and stop trace-points

Figure 5-30. Source code editor



Scroll up to line ~~156~~ in the file ~~acc_example.c~~ and right-click at the left edge of the editor. Select **Add Tracepoint...** from the pop-up menu.

Figure 5-31. Tracepoint (Start)



Set Tracepoint Configuration values:

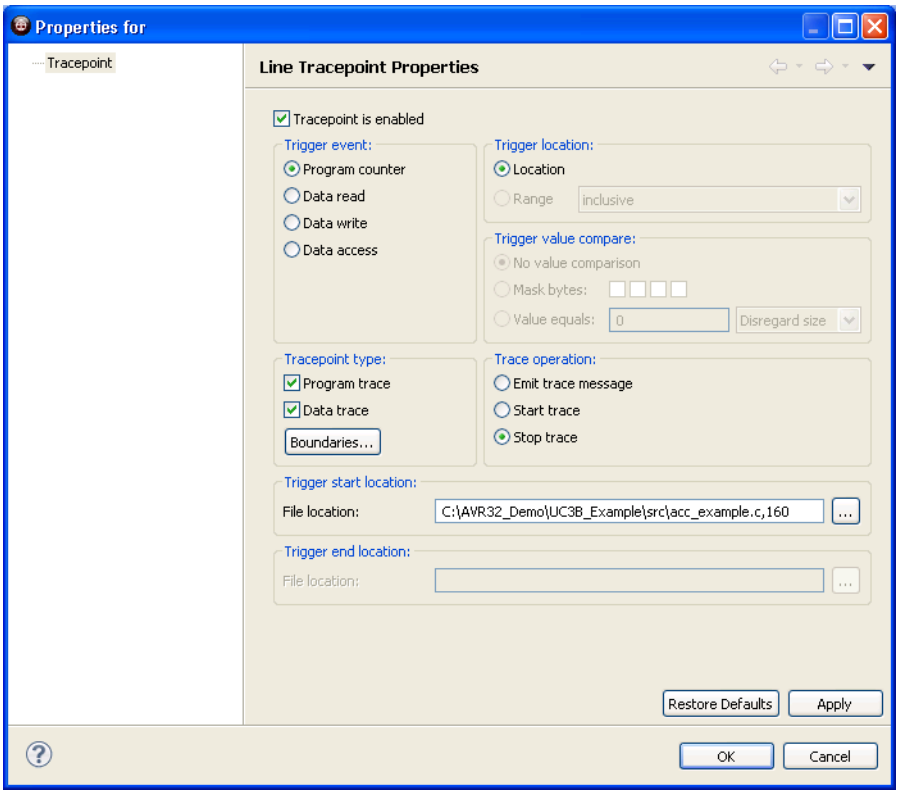
- Set *Trigger Event* to *Program Counter*
- Set *Trace Operation* to *Start Trace*
- Set *Tracepoint type* to both *Program trace* and *Data trace*
- Click **OK**

This will create a tracepoint that starts both program and data trace when the program counter hits this code line.

~~Scroll down to line 160 in the file acc_example.c and right-click at the left edge of the editor. Select **Add Tracepoint...** from the pop-up menu.~~

Don't add any stop trace point for now

Figure 5-32. Tracepoint (Stop)



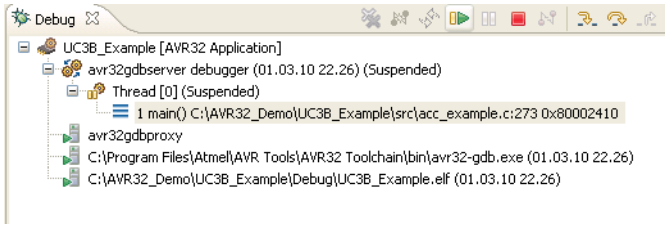
~~Set Tracepoint Configuration values:~~

- ~~Set *Trigger Event* to *Program Counter*~~
- ~~Set *Trace Operation* to *Stop Trace*~~
- ~~Set *Tracepoint type* to both *Program trace* and *Data trace*~~
- ~~Click **OK**~~

~~This will create a tracepoint that stops both program and data trace when the program counter hits this code line.~~

5.7 Start the trace debug session

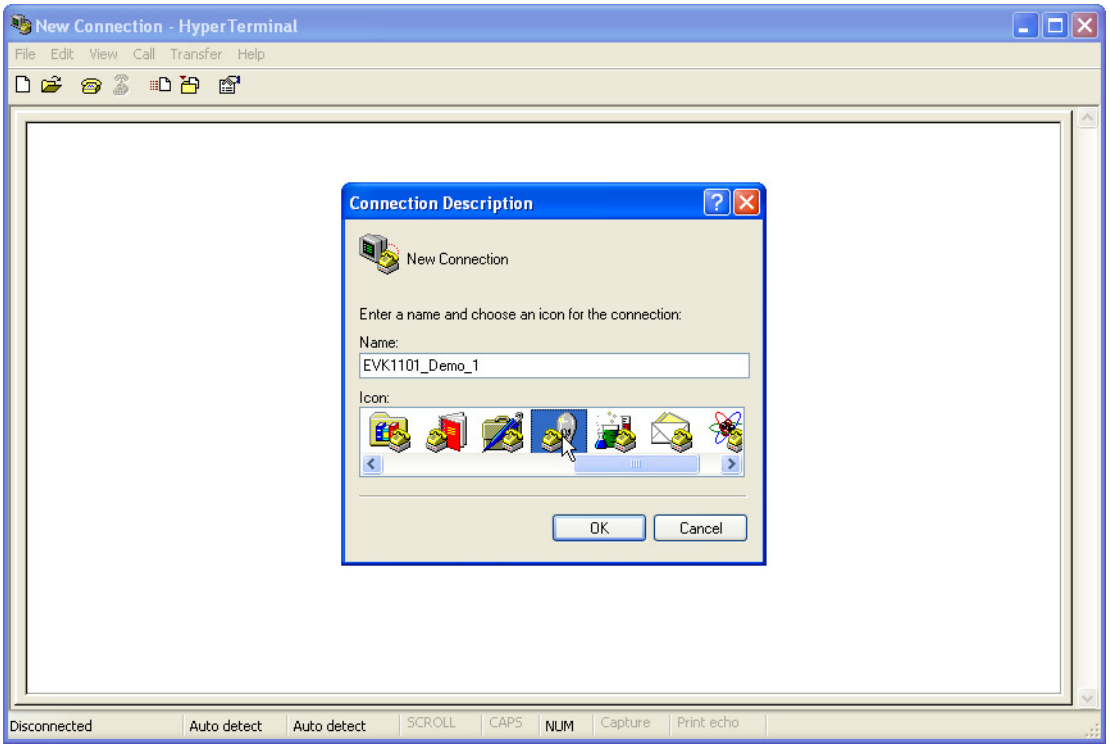
Figure 5-33. Resume debug session



Make sure that the `main()` process is still selected in the *Debug* view before pressing the **Resume** button.

Start a serial port terminal to view the output from the debug UART. To make it simple, we just start Hyperterminal. Click on *Start>All Programs>Accessories>Communications>Hyperterminal*.

Figure 5-34. New Hyperterminal

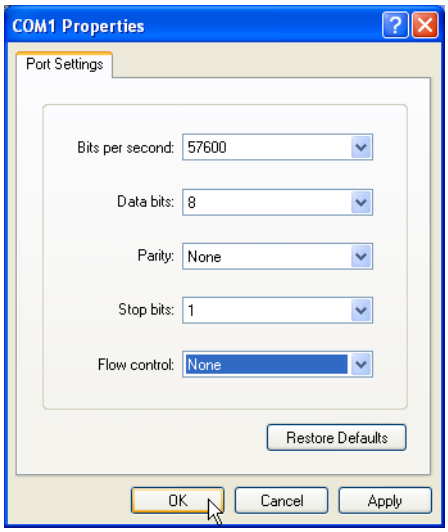


Enter a name for the session and click **OK**.

Figure 5-35. Hyperterminal port selection

Seletc the com-port that you connected the ~~EVK1101~~ to ~~(in this case we use **Com1**).~~

Figure 5-36. Hyperterminal port configuration

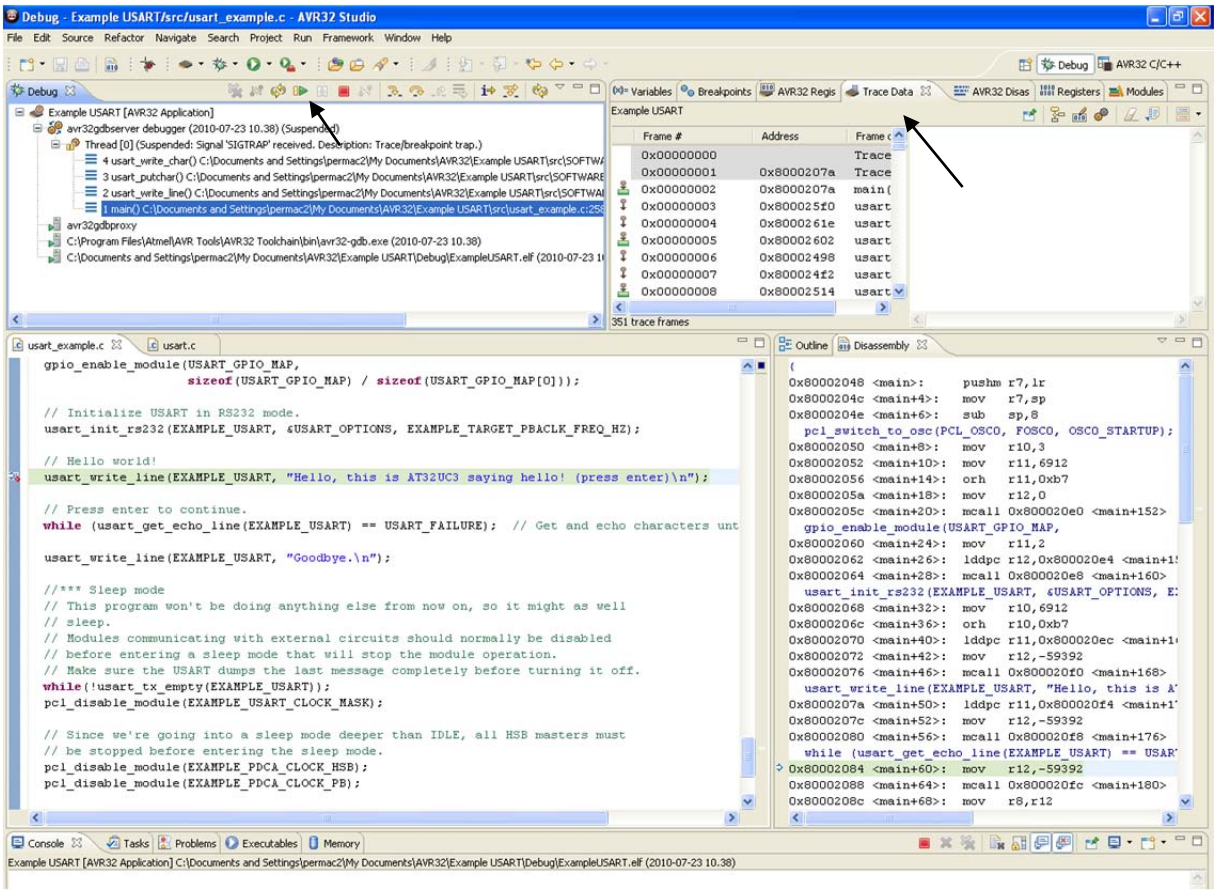


Set port parameters:

- Bits per second: 57600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

Click **OK**.

In AVR32 studio we can now press resume and look in the Trace Data tab up to the right.



If we scroll to a bit we will see that 0x48 has been send to the HyperTerminal. If we look in the ASCII table we will see that this corresponds to the character “H” which is the first character in “Hello, this is AT32UC3 saying hello! (press enter)”. In the HyperTerminal we can also see the characters printed.