Atmel Studio
An Introductory Tutorial

Acknowledgements

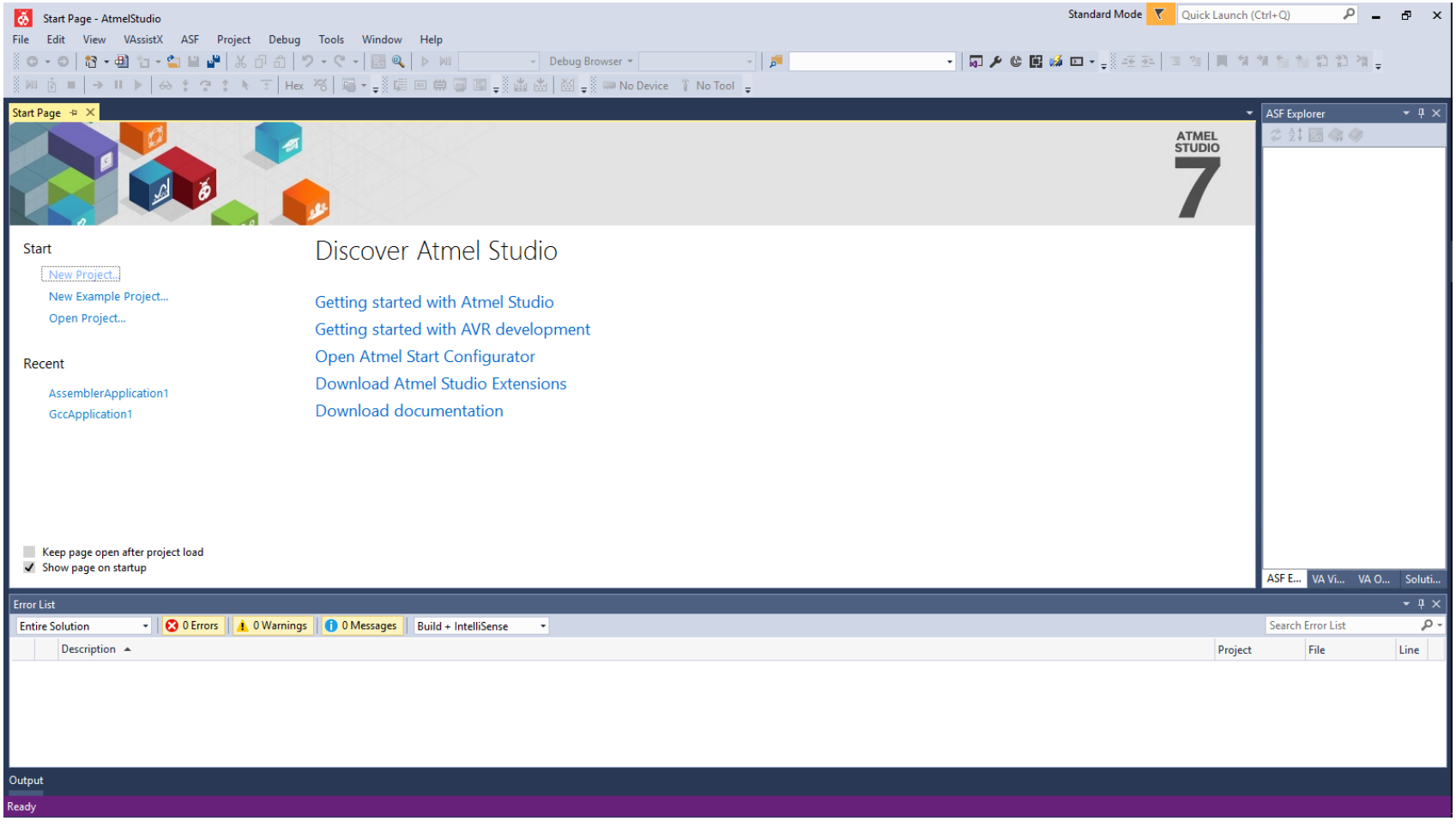
This tutorial is prepared by Mohammad Azfar Tariq and Muhammad Usman under the supervision of Dr. Rehan Ahmed for the course EE-222 Microprocessor Systems. Reporting any error or discrepancy found in the tutorial is appreciated.

Contents

Initialize Project

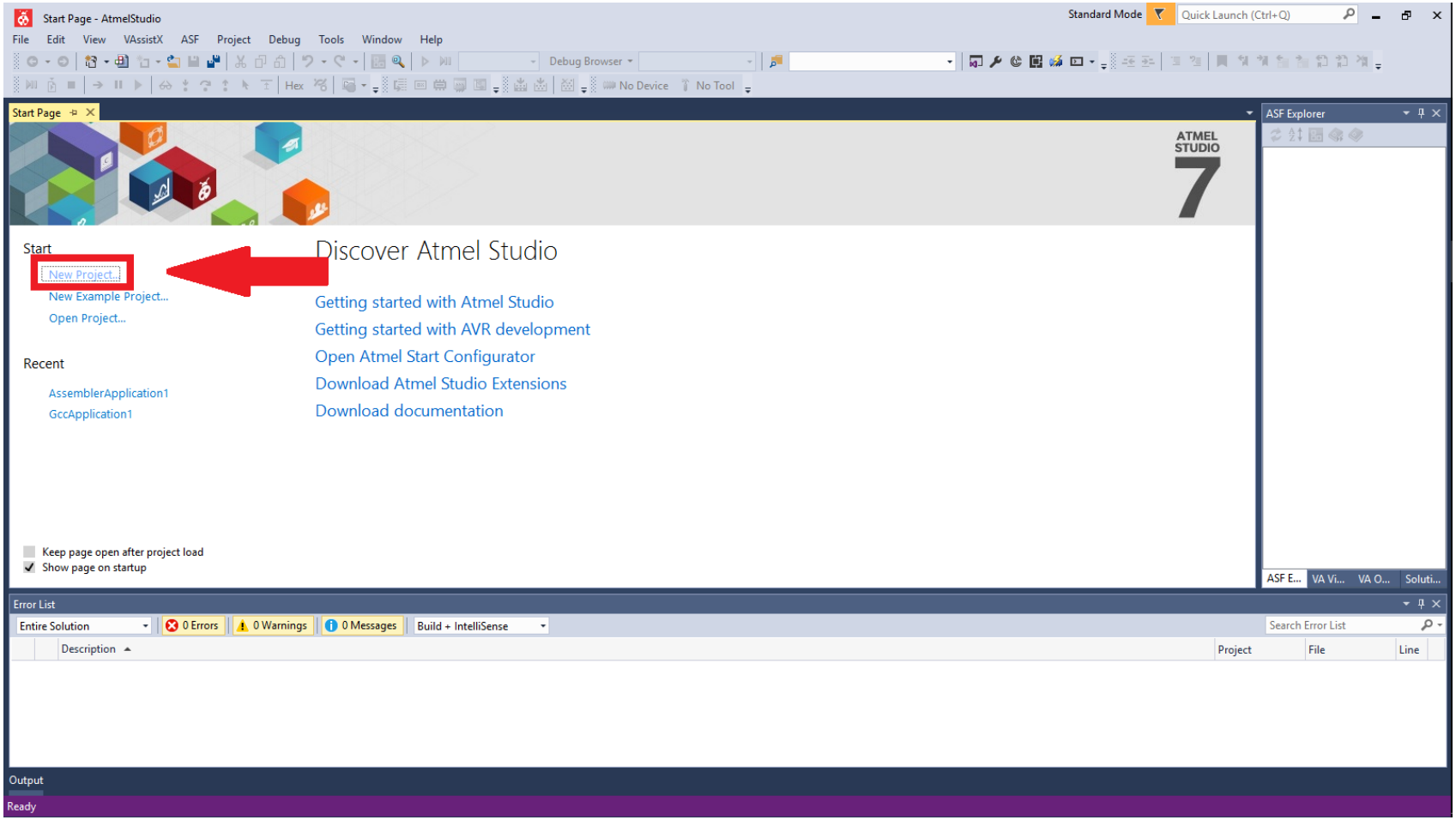
Initialize Project

Open Atmel Studio 7.0


Start Page - AtmelStudio
Standard Mode
Quick Launch (Ctrl+Q)
File Edit View VAssistX ASF Project Debug Tools Window Help
Debug Browser
Hex
No Device
No Tool
Start Page
ATMEL STUDIO 7
Start
New Project...
New Example Project...
Open Project...
Recent
AssemblerApplication1
GccApplication1
Discover Atmel Studio
Getting started with Atmel Studio
Getting started with AVR development
Open Atmel Start Configurator
Download Atmel Studio Extensions
Download documentation
Keep page open after project load
Show page on startup
ASF Explorer
ASF E...
VA Vi...
VA O...
Soluti...
Error List
Entire Solution
0 Errors
0 Warnings
0 Messages
Build + IntelliSense
Search Error List
Description
Project
File
Line
Output
Ready

Initialize Project

Click on New Project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Show page on startup
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VA Vi...
VA O...
Soluti...
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Description
Project
File
Line
Output
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New Project

Recent

Installed

C/C++

Assembler

AtmelStudio Solution

Sort by: Default

Search Installed Templates (Ctrl+E)

GCC C ASF Board Project	C/C++
GCC C Executable Project	C/C++
GCC C Static Library Project	C/C++
GCC C++ Executable Project	C/C++
GCC C++ Static Library Project	C/C++
SAM L11 Secure Solution v1.0	C/C++
Create project from Arduino sketch	C/C++

Type: C/C++

Creates an project for Atmel or User boards using ASF

Name: GccBoardProject1

Location: c:\users\muhammad usman\Documents\Atmel Studio\7.0

Browse...

Solution name: GccBoardProject1

Create directory for solution

OK

Cancel

Initialize Project

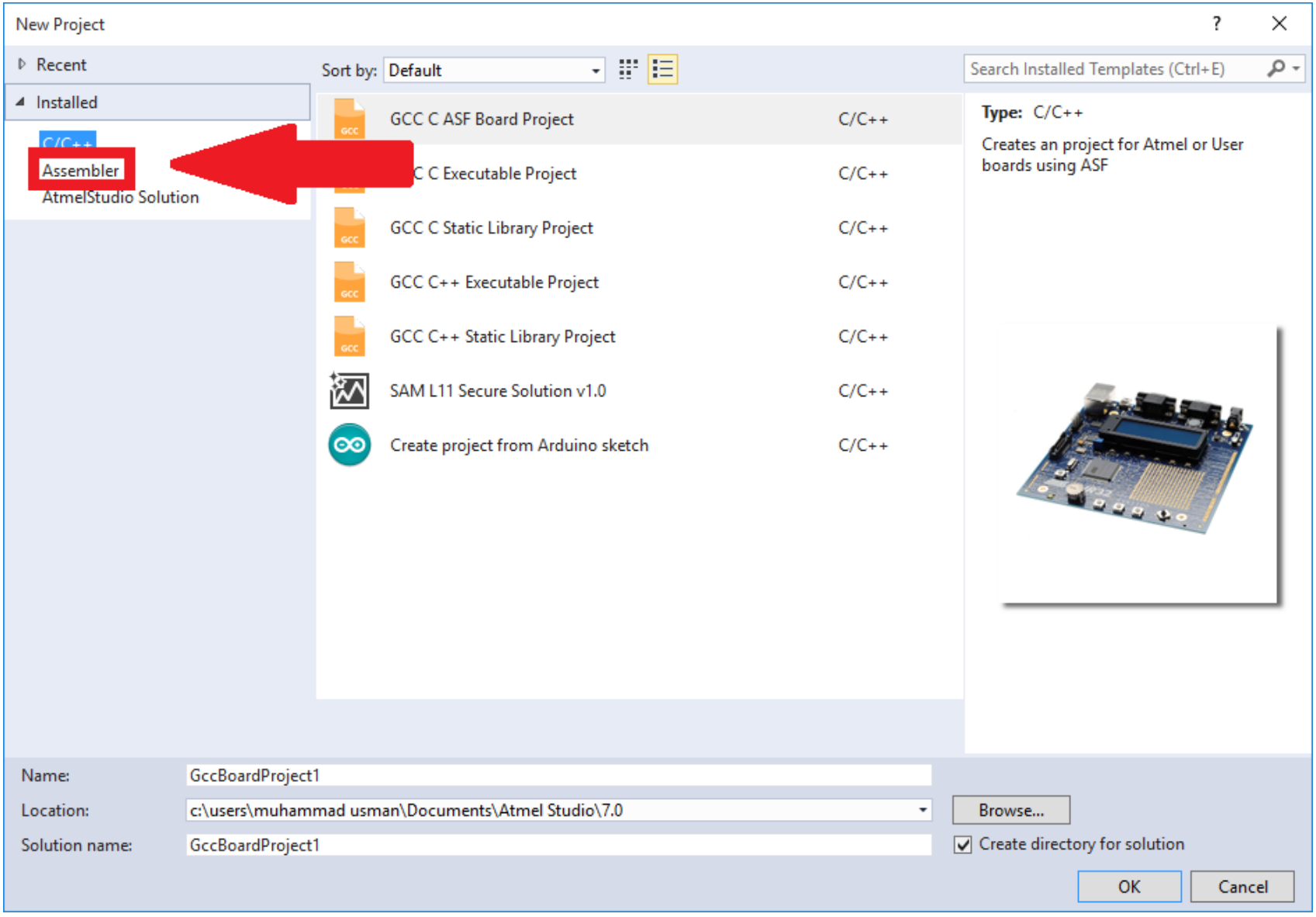
Project Type

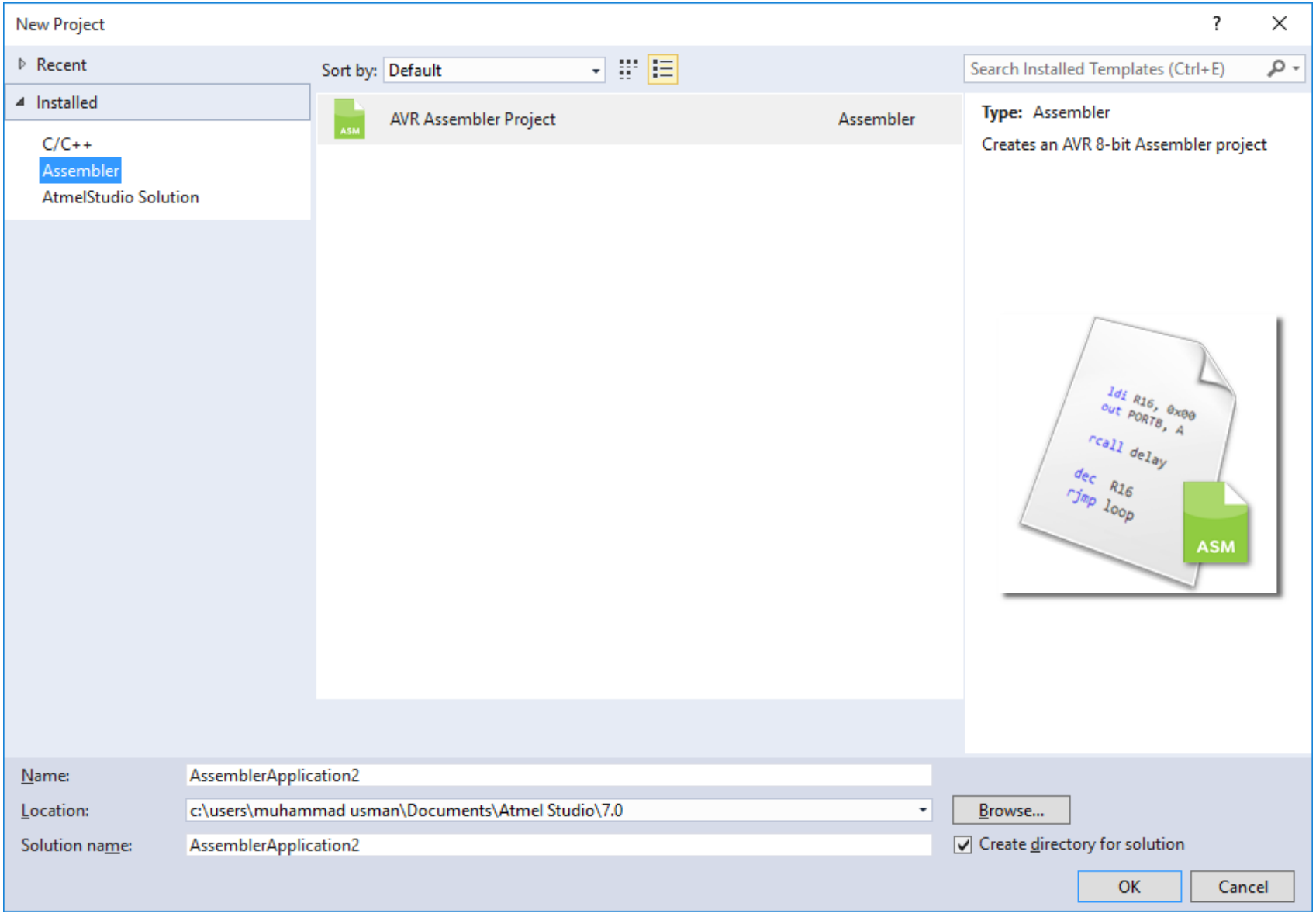
- **ASF Board Project**
  The project contains built-in libraries
- **C Exucutable Project**
  Project for bare-metal C programming

Initialize Project

Project Type

Click on Assembler


New Project
Recent
Installed
C/C++
Assembler
AtmelStudio Solution
Sort by: Default
Search Installed Templates (Ctrl+E)
GCC C ASF Board Project C/C++
C C Executable Project C/C++
GCC C Static Library Project C/C++
GCC C++ Executable Project C/C++
GCC C++ Static Library Project C/C++
SAM L11 Secure Solution v1.0 C/C++
Create project from Arduino sketch C/C++
Type: C/C++
Creates an project for Atmel or User boards using ASF
Name: GccBoardProject1
Location: c:\users\muhammad usman\Documents\Atmel Studio\7.0
Browse...
Solution name: GccBoardProject1
Create directory for solution
OK
Cancel

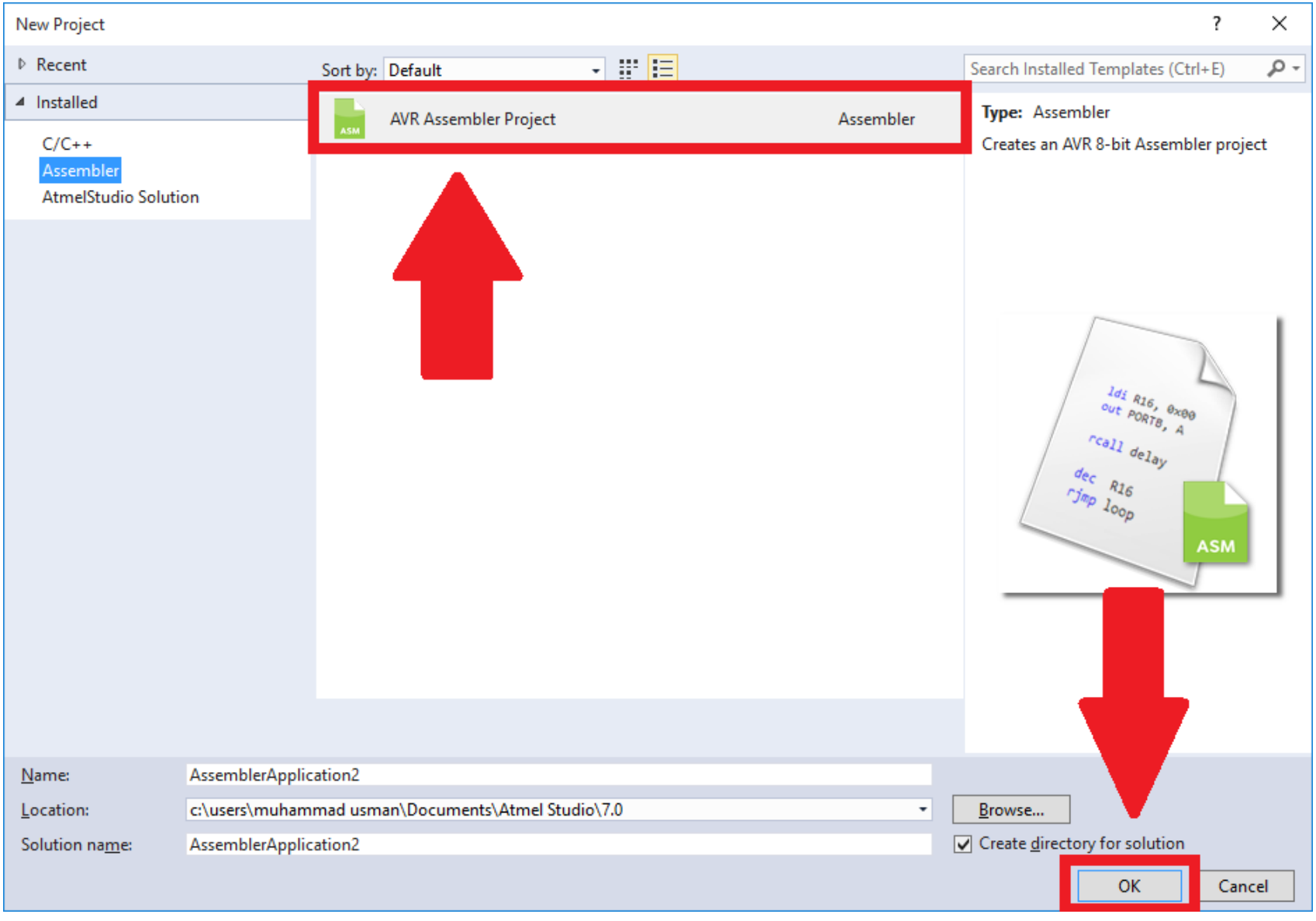

New Project
Recent
Installed
C/C++
Assembler
AtmelStudio Solution
Sort by: Default
Search Installed Templates (Ctrl+E)
AVR Assembler Project
Assembler
Type: Assembler
Creates an AVR 8-bit Assembler project
ldi R16, 0x00
out PORTB, A
rcall delay
dec R16
rjmp loop
ASM
Name:
AssemblerApplication2
Location:
c:\users\muhammad usman\Documents\Atmel Studio\7.0
Browse...
Solution name:
AssemblerApplication2
Create directory for solution
OK
Cancel

Initialize Project

Project Type

Select AVR Assembler Project

Click OK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AtmelStudio Solution
Sort by: Default
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dec R16
rjmp loop
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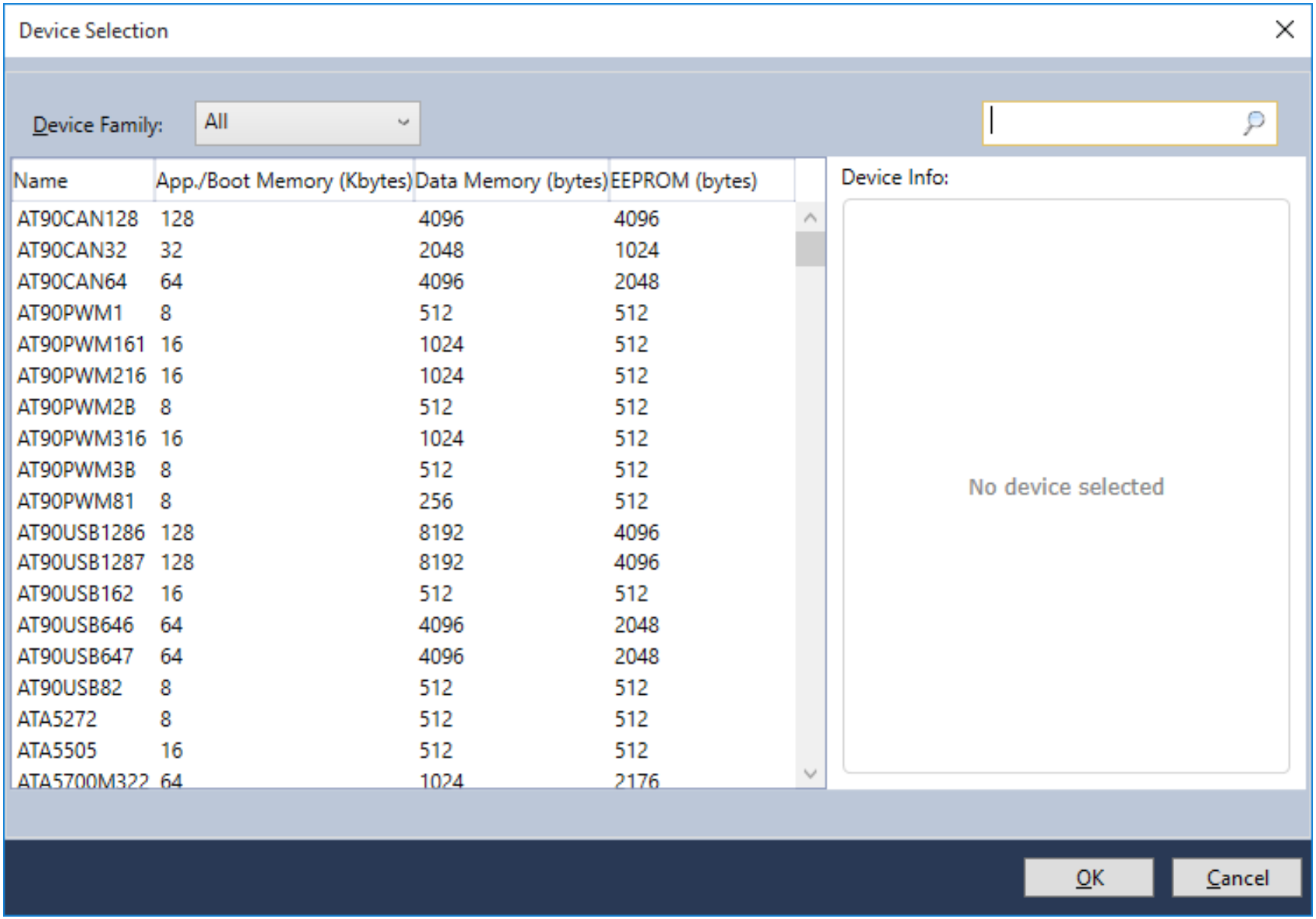
Name:
AssemblerApplication2
Location:
c:\users\muhammad usman\Documents\Atmel Studio\7.0
Browse...
Solution name:
AssemblerApplication2
Create directory for solution
OK
Cancel

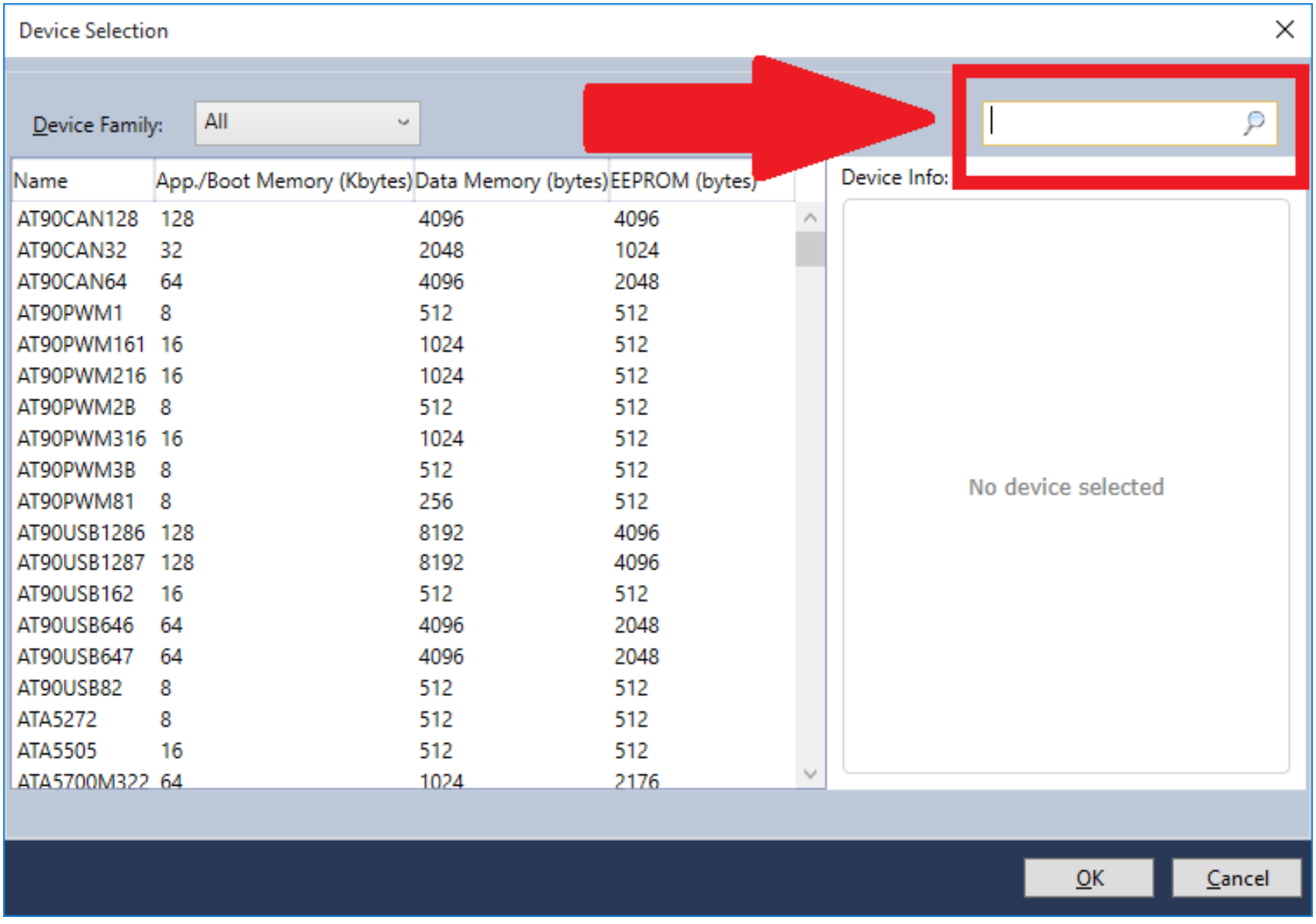

Device Selection
Device Family:
All
Name
App./Boot Memory (Kbytes)
Data Memory (bytes)
EEPROM (bytes)
AT90CAN128 128 4096 4096
AT90CAN32 32 2048 1024
AT90CAN64 64 4096 2048
AT90PWM1 8 512 512
AT90PWM161 16 1024 512
AT90PWM216 16 1024 512
AT90PWM2B 8 512 512
AT90PWM316 16 1024 512
AT90PWM3B 8 512 512
AT90PWM81 8 256 512
AT90USB1286 128 8192 4096
AT90USB1287 128 8192 4096
AT90USB162 16 512 512
AT90USB646 64 4096 2048
AT90USB647 64 4096 2048
AT90USB82 8 512 512
ATA5272 8 512 512
ATA5505 16 512 512
ATA5700M322 64 1024 2176
Device Info:
No device selected
OK
Cancel

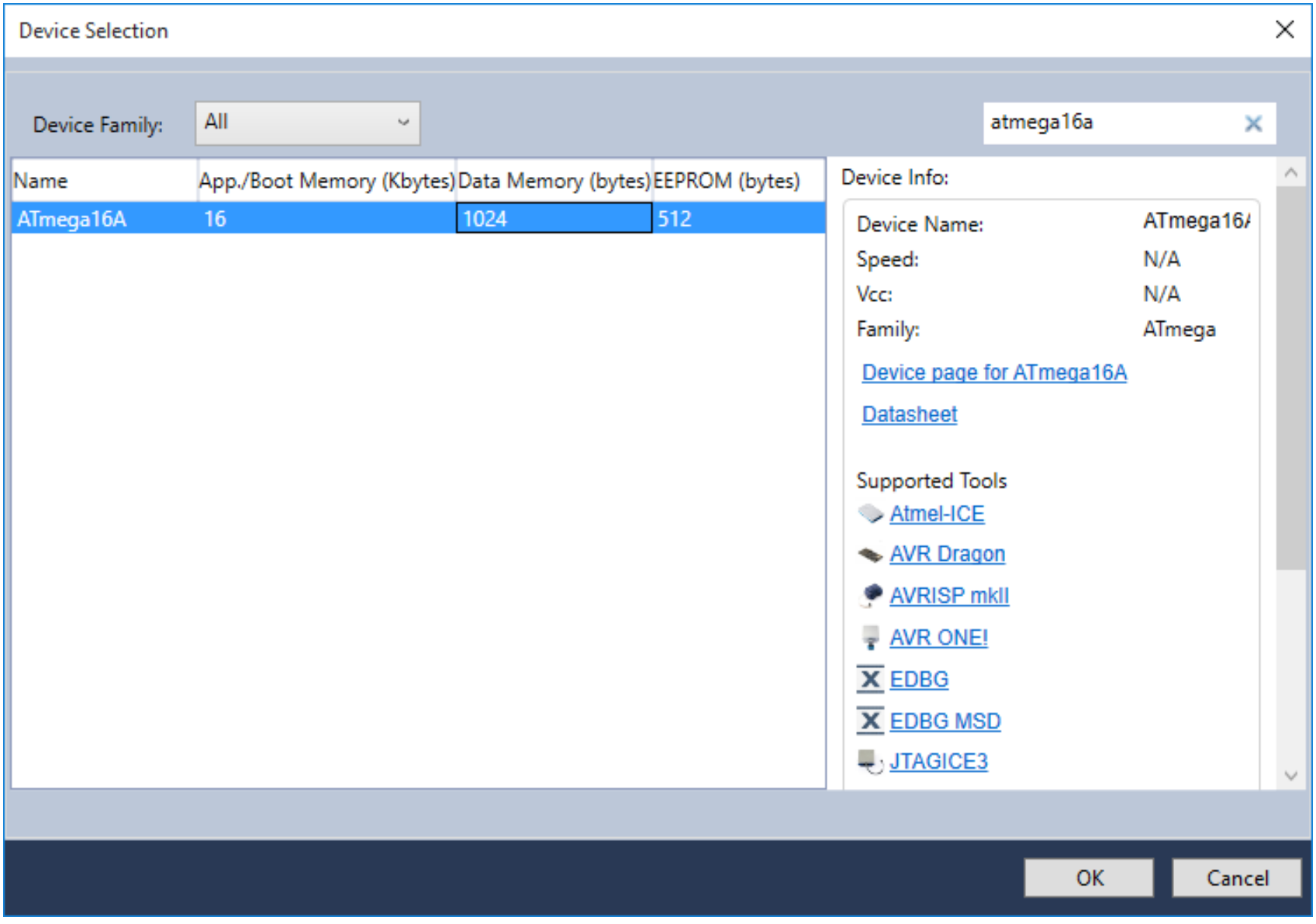
Initialize Project

Select μC

Type in the search box

ATmega16A


Device Selection
Device Family:
All
Name
App./Boot Memory (Kbytes)
Data Memory (bytes)
EEPROM (bytes)
AT90CAN128 128 4096 4096
AT90CAN32 32 2048 1024
AT90CAN64 64 4096 2048
AT90PWM1 8 512 512
AT90PWM161 16 1024 512
AT90PWM216 16 1024 512
AT90PWM2B 8 512 512
AT90PWM316 16 1024 512
AT90PWM3B 8 512 512
AT90PWM81 8 256 512
AT90USB1286 128 8192 4096
AT90USB1287 128 8192 4096
AT90USB162 16 512 512
AT90USB646 64 4096 2048
AT90USB647 64 4096 2048
AT90USB82 8 512 512
ATA5272 8 512 512
ATA5505 16 512 512
ATA5700M322 64 1024 2176
Device Info:
No device selected
OK
Cancel

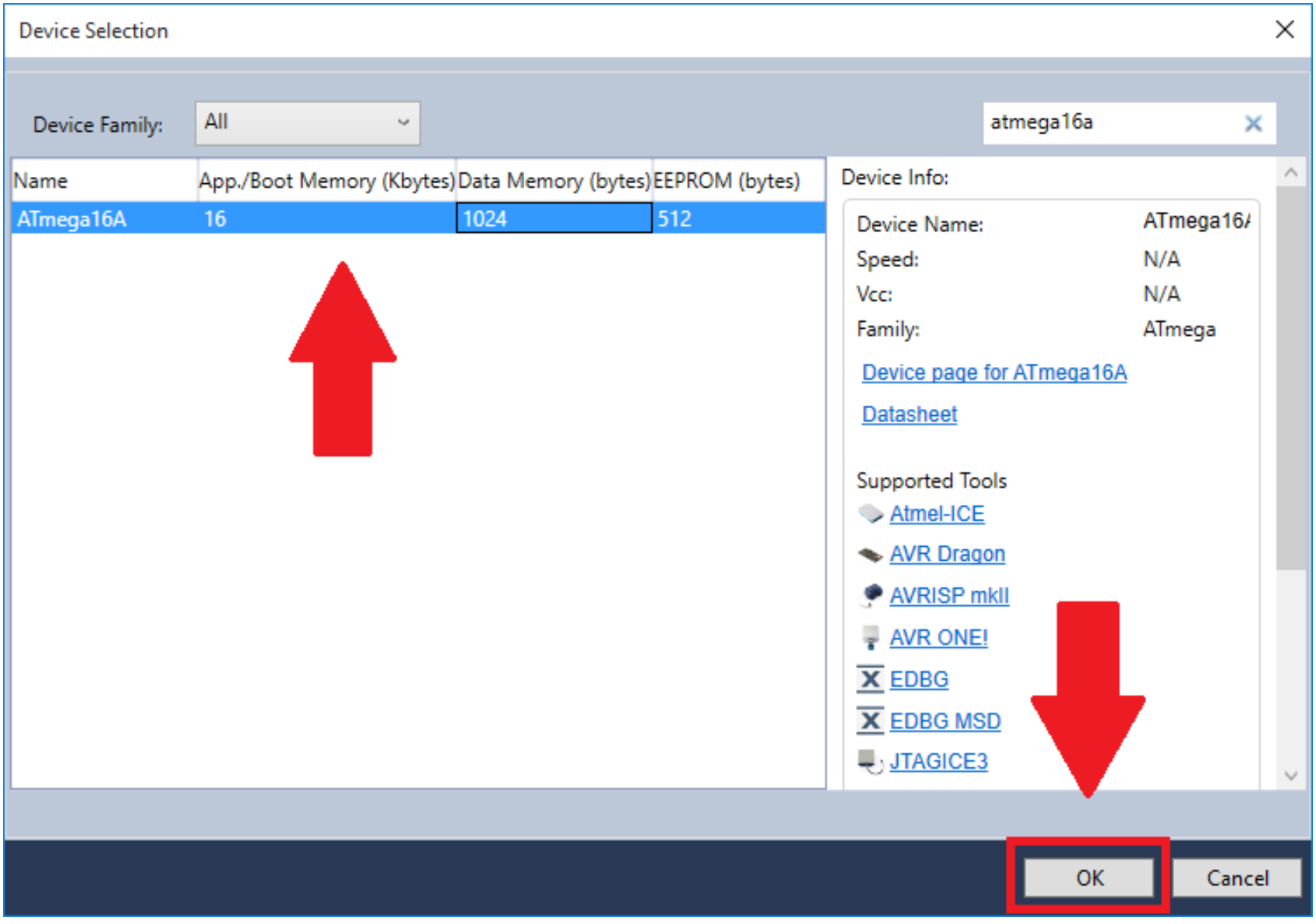

Device Selection
Device Family:
All
atmega16a
Name
App./Boot Memory (Kbytes)
Data Memory (bytes)
EEPROM (bytes)
ATmega16A
16
1024
512
Device Info:
Device Name:
ATmega16A
Speed:
N/A
Vcc:
N/A
Family:
ATmega
Device page for ATmega16A
Datasheet
Supported Tools
Atmel-ICE
AVR Dragon
AVRISP mkII
AVR ONE!
EDBG
EDBG MSD
JTAGICE3
OK
Cancel

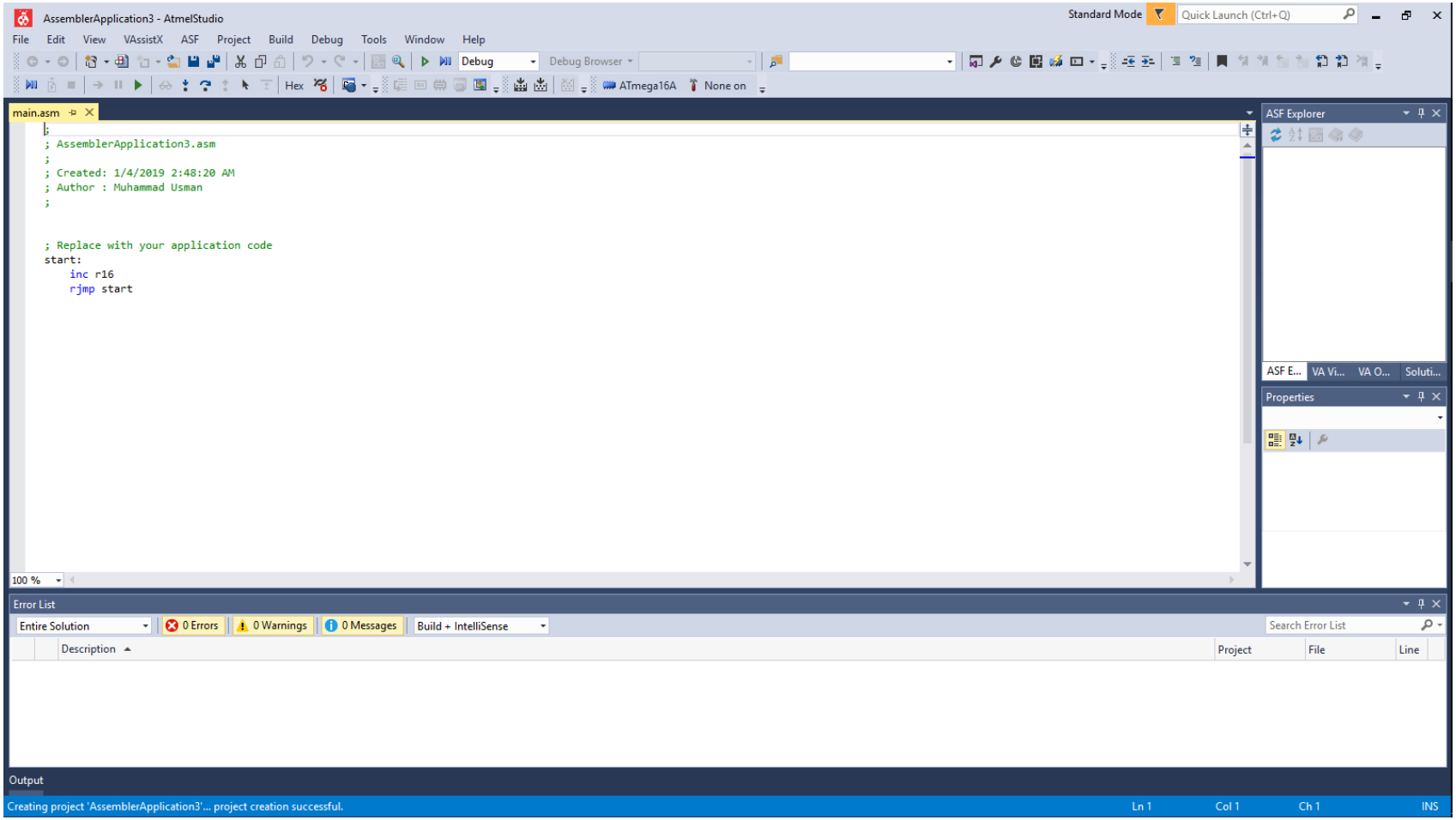
Initialize Project

Select μC

Select ATmega16A

Click OK


Device Selection
Device Family:
All
atmega16a
Name
App./Boot Memory (Kbytes)
Data Memory (bytes)
EEPROM (bytes)
ATmega16A
16
1024
512
Device Info:
Device Name:
ATmega16A
Speed:
N/A
Vcc:
N/A
Family:
ATmega
Device page for ATmega16A
Datasheet
Supported Tools
Atmel-ICE
AVR Dragon
AVRISP mkII
AVR ONE!
EDBG
EDBG MSD
JTAGICE3
OK
Cancel


AssemblerApplication3 - AtmelStudio
Standard Mode
Quick Launch (Ctrl+Q)
File Edit View VAssistX ASF Project Build Debug Tools Window Help
Debug
Debug Browser
Hex
ATmega16A
None on
main.asm
;
; AssemblerApplication3.asm
;
; Created: 1/4/2019 2:48:20 AM
; Author : Muhammad Usman
;
; Replace with your application code
start:
inc r16
rjmp start
100 %
ASF Explorer
ASF E...
VA Vi...
VA O...
Soluti...
Properties
Error List
Entire Solution
0 Errors
0 Warnings
0 Messages
Build + IntelliSense
Search Error List
Description
Project
File
Line
Output
Creating project 'AssemblerApplication3'... project creation successful.
Ln 1
Col 1
Ch 1
INS

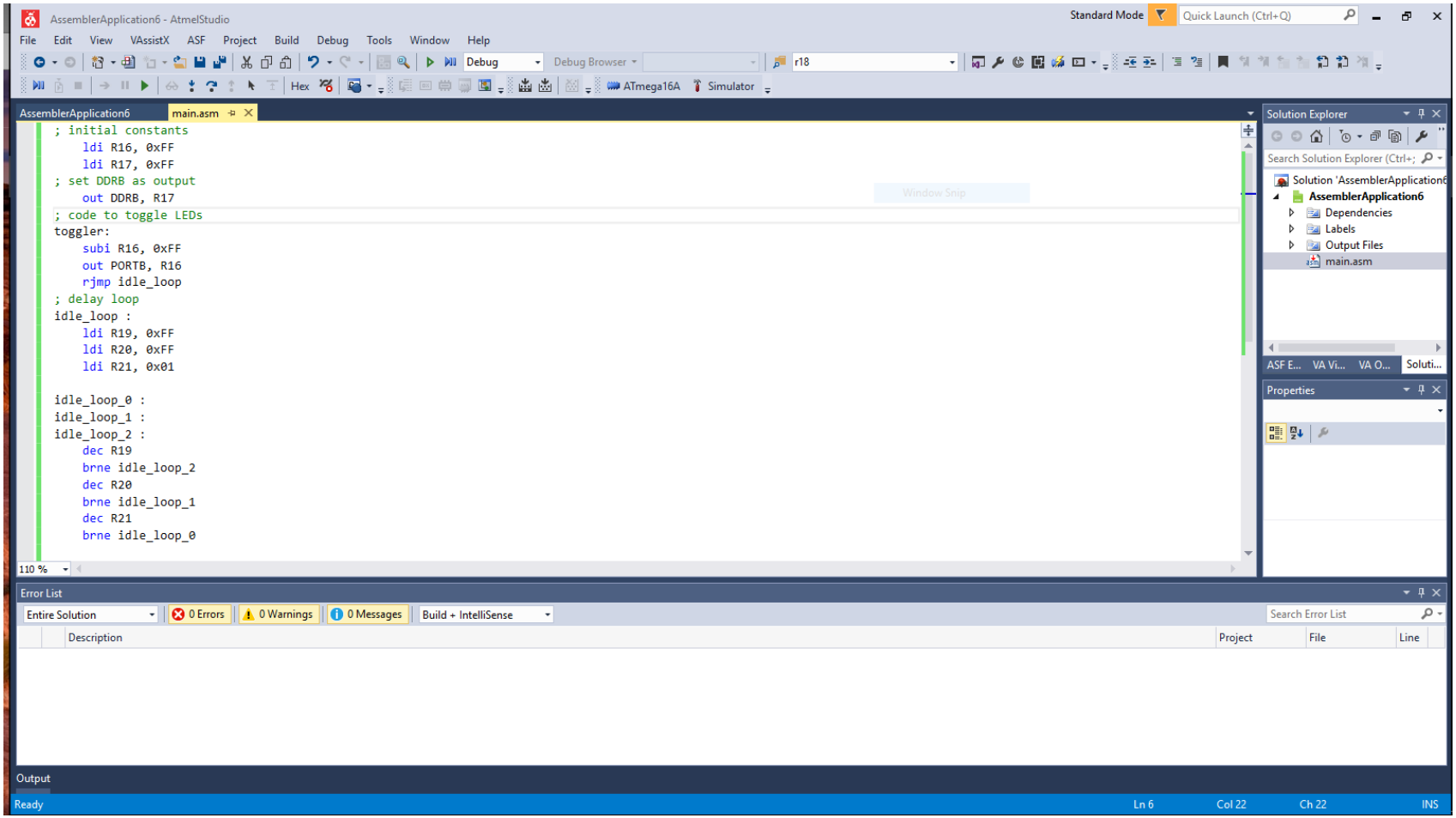
Coding

Coding

Editor window appears

Copy & Paste the lab 1 code

Save

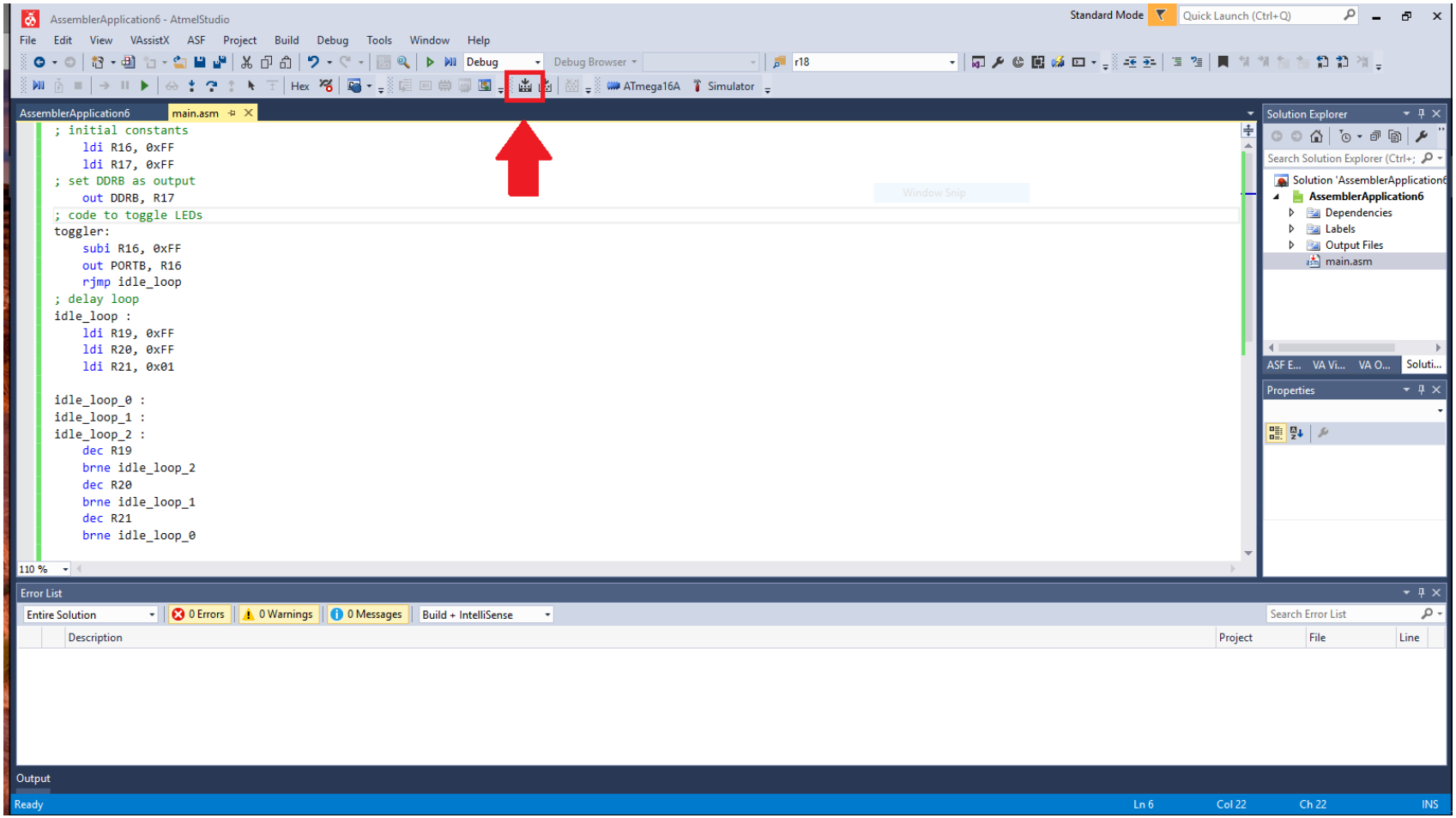

AssemblerApplication6 - AtmelStudio
Standard Mode
Quick Launch (Ctrl+Q)
File Edit View VAssistX ASF Project Build Debug Tools Window Help
Debug
Debug Browser
r18
Hex
ATmega16A
Simulator
AssemblerApplication6
main.asm
; initial constants
ldi R16, 0xFF
ldi R17, 0xFF
; set DDRB as output
out DDRB, R17
; code to toggle LEDs
toggler:
subi R16, 0xFF
out PORTB, R16
rjmp idle_loop
; delay loop
idle_loop :
ldi R19, 0xFF
ldi R20, 0xFF
ldi R21, 0x01
idle_loop_0 :
idle_loop_1 :
idle_loop_2 :
dec R19
brne idle_loop_2
dec R20
brne idle_loop_1
dec R21
brne idle_loop_0
110 %
Solution Explorer
Search Solution Explorer (Ctrl+;
Solution 'AssemblerApplication6'
AssemblerApplication6
Dependencies
Labels
Output Files
main.asm
ASF E... VA Vi... VA O... Soluti...
Properties
Error List
Entire Solution
0 Errors
0 Warnings
0 Messages
Build + IntelliSense
Search Error List
Description
Project
File
Line
Output
Ready
Ln 6
Col 22
Ch 22
INS

Generate Hex File

Hex File

Build Solution

Press the Build button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Debug Browser
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ldi R20, 0xFF
ldi R21, 0x01
idle_loop_0 :
idle_loop_1 :
idle_loop_2 :
dec R19
brne idle_loop_2
dec R20
brne idle_loop_1
dec R21
brne idle_loop_0
110 %
Solution Explorer
Search Solution Explorer (Ctrl+;
Solution 'AssemblerApplication6'
AssemblerApplication6
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Output Files
main.asm
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0 Errors
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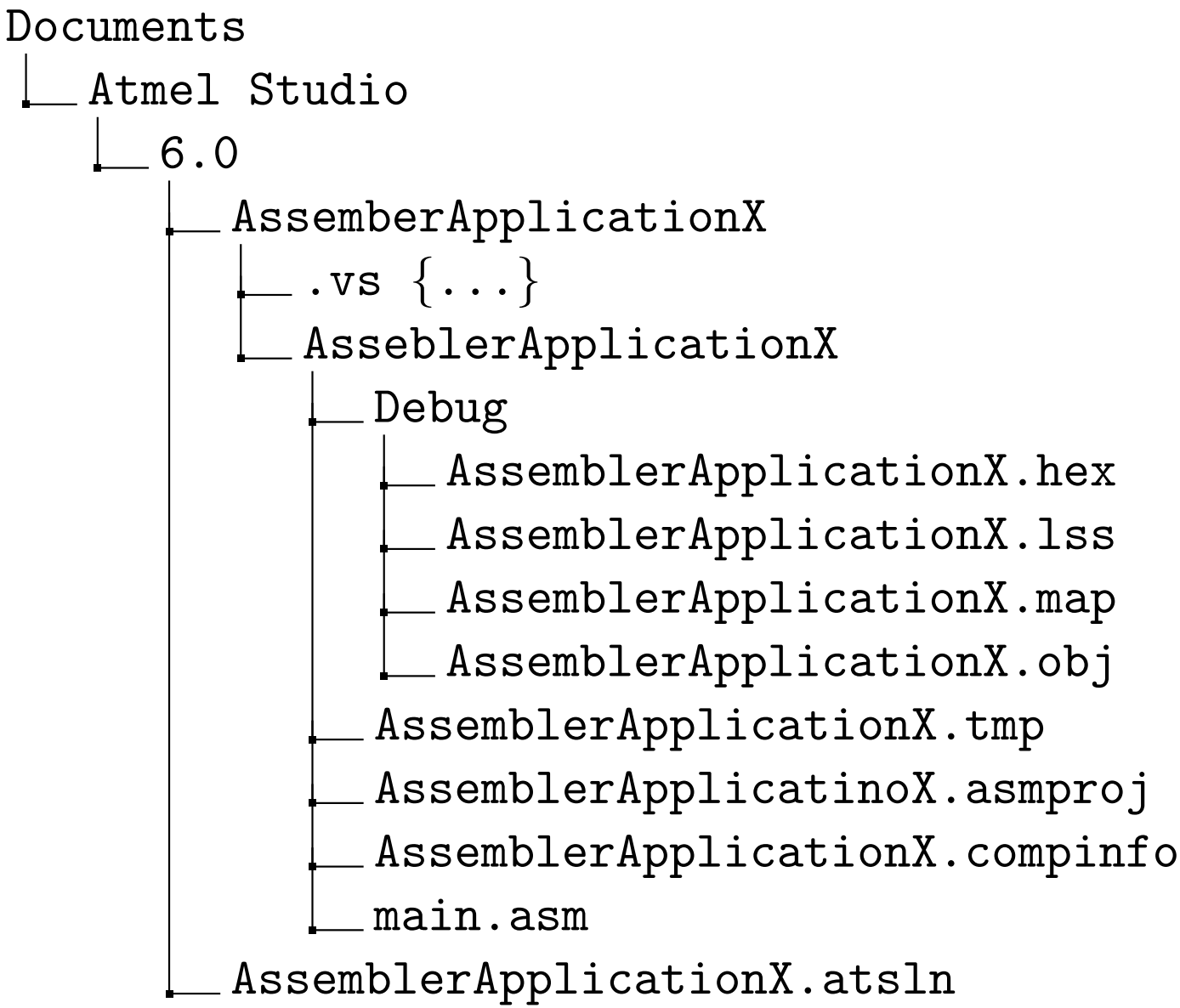
0 Messages
Build + IntelliSense
Search Error List
Description
Project
File
Line
Output
Ready
Ln 6
Col 22
Ch 22
INS

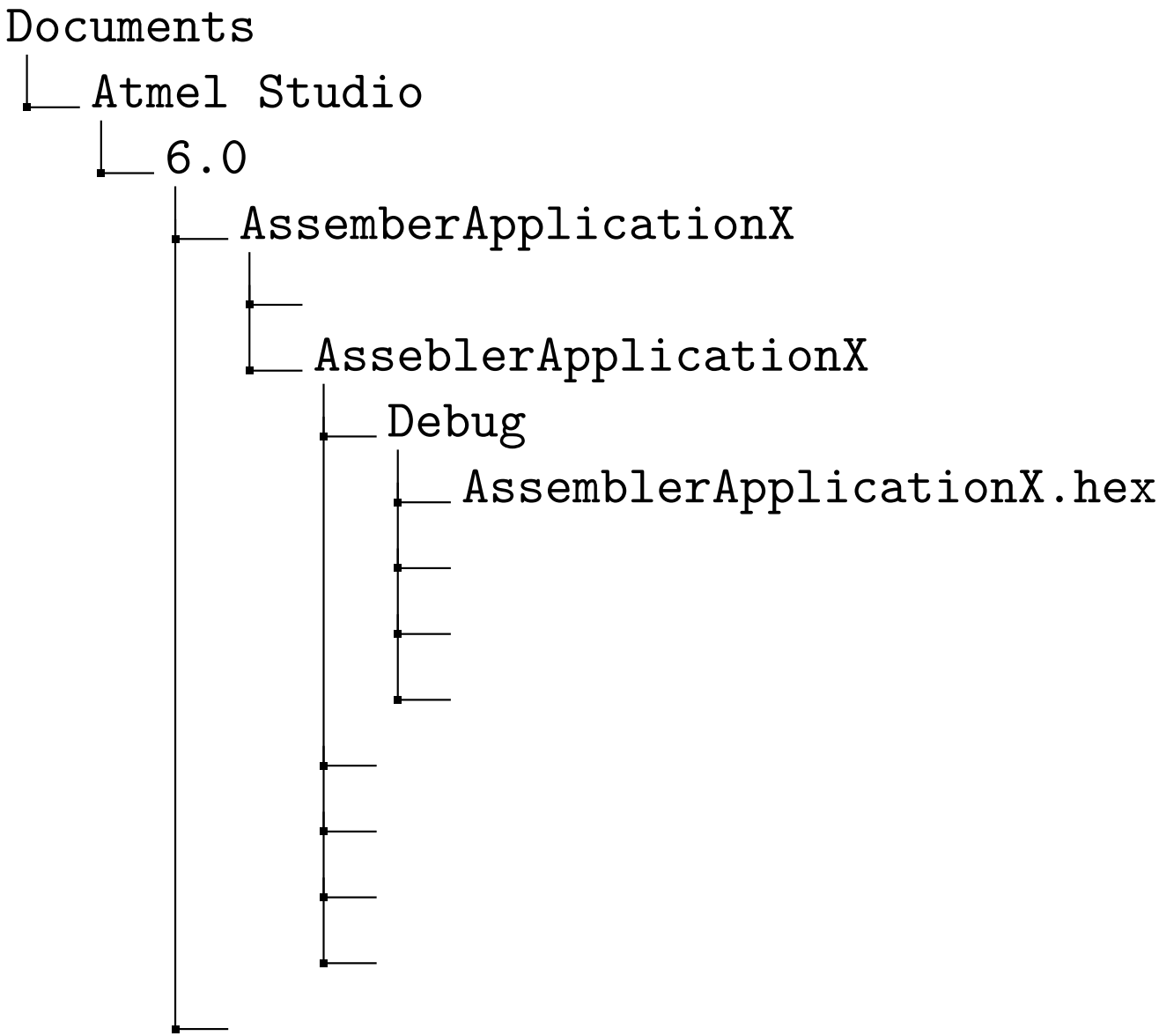
Hex File

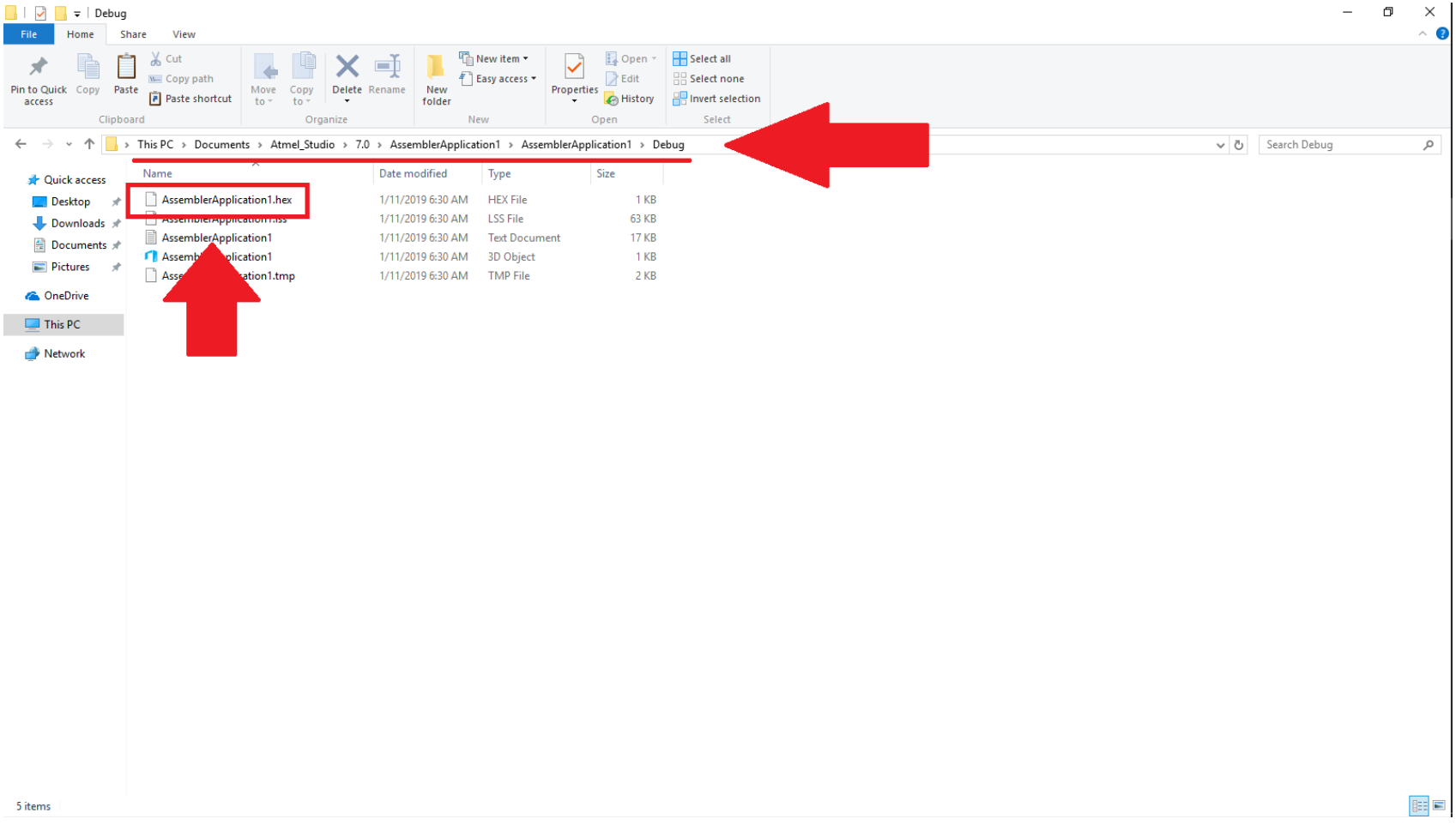
Locate



Hex File

Locate



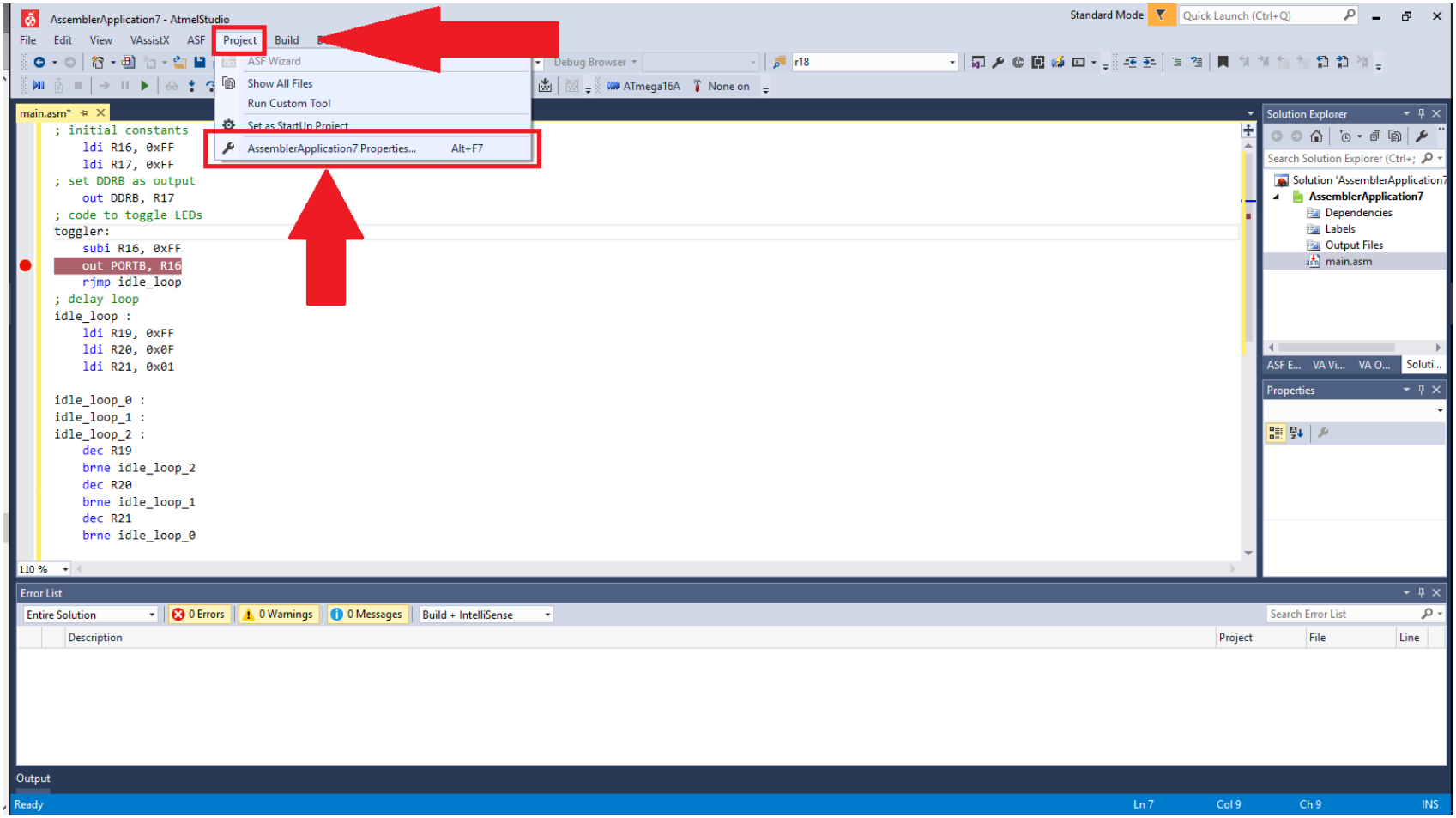

Debug
File
Home
Share
View
Pin to Quick access
Copy
Paste
Cut
Copy path
Paste shortcut
Clipboard
Move to
Copy to
Delete
Rename
Organize
New folder
New item
Easy access
New
Properties
Open
Edit
History
Open
Select all
Select none
Invert selection
Select
This PC › Documents › Atmel_Studio › 7.0 › AssemblerApplication1 › AssemblerApplication1 › Debug
Search Debug
Quick access
Desktop
Downloads
Documents
Pictures
OneDrive
This PC
Network
Name
Date modified
Type
Size
AssemblerApplication1.hex
1/11/2019 6:30 AM
HEX File
1 KB
1/11/2019 6:30 AM
LSS File
63 KB
AssemblerApplication1
1/11/2019 6:30 AM
Text Document
17 KB
1/11/2019 6:30 AM
3D Object
1 KB
1/11/2019 6:30 AM
TMP File
2 KB
5 items

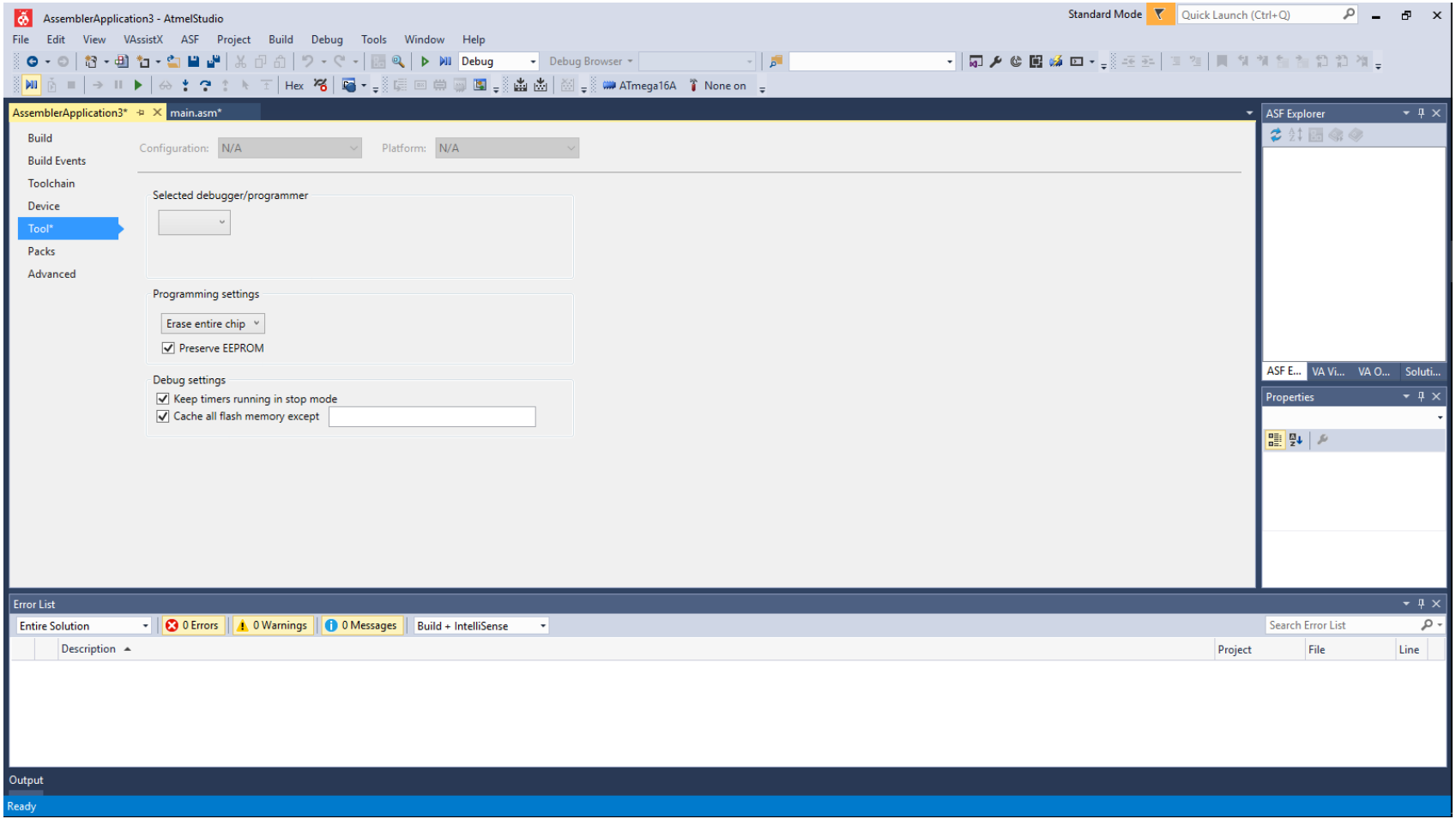
Debugging

Select Simulator

Project > AssemblerApplicationX Properties... > Tools

Debugging

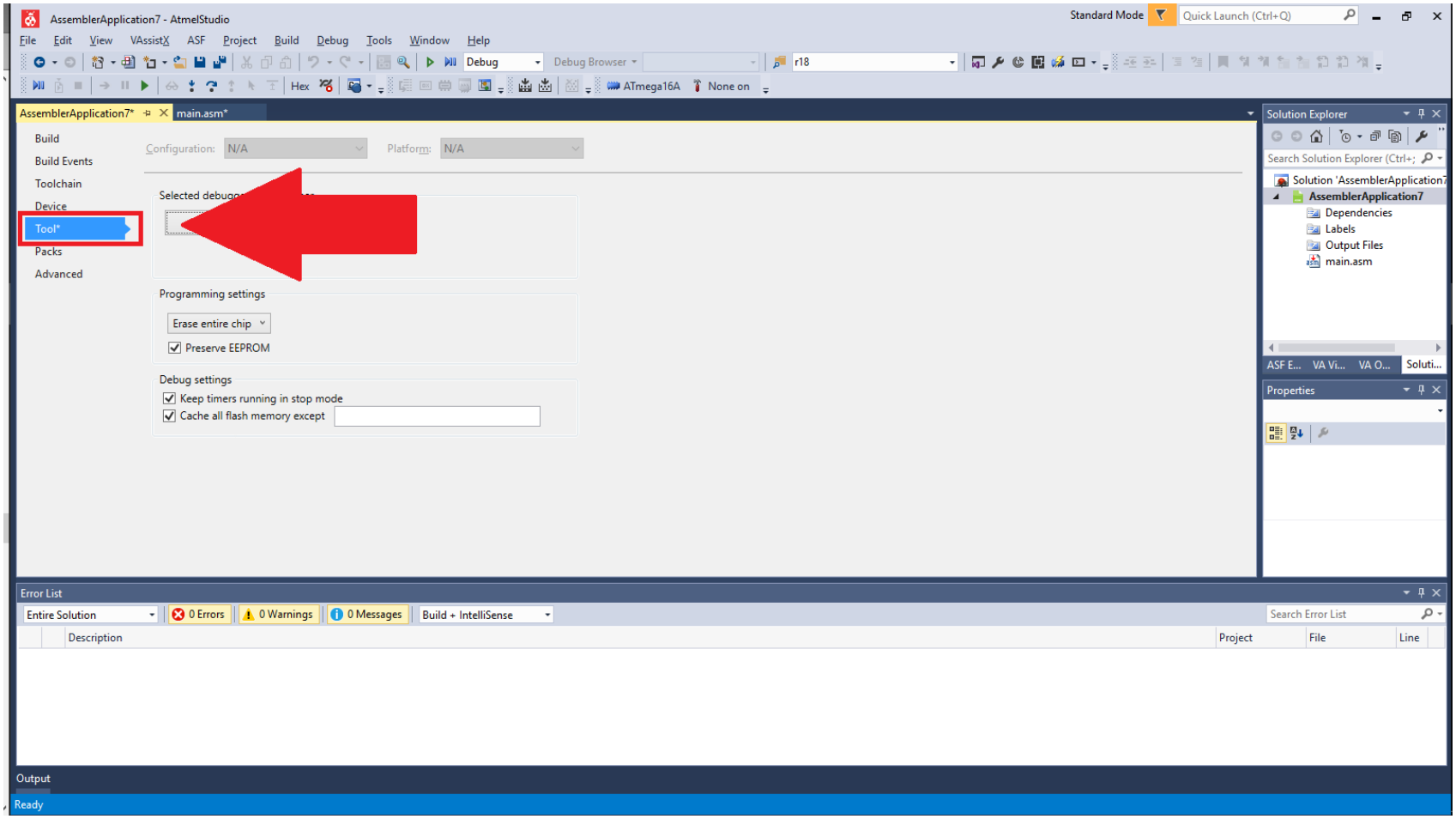

AssemblerApplication7 - AtmelStudio
Standard Mode
Quick Launch (Ctrl+Q)
File Edit View VAssistX ASF Project Build
ASF Wizard
Show All Files
Run Custom Tool
Set as StartUp Project
AssemblerApplication7 Properties... Alt+F7
Debug Browser
r18
ATmega16A
None on
main.asm*
; initial constants
ldi R16, 0xFF
ldi R17, 0xFF
; set DDRB as output
out DDRB, R17
; code to toggle LEDs
toggler:
subi R16, 0xFF
out PORTB, R16
rjmp idle_loop
; delay loop
idle_loop :
ldi R19, 0xFF
ldi R20, 0x0F
ldi R21, 0x01
idle_loop_0 :
idle_loop_1 :
idle_loop_2 :
dec R19
brne idle_loop_2
dec R20
brne idle_loop_1
dec R21
brne idle_loop_0
110 %
Solution Explorer
Search Solution Explorer (Ctrl+;
Solution 'AssemblerApplication7
AssemblerApplication7
Dependencies
Labels
Output Files
main.asm
ASF E... VA Vi... VA O... Soluti...
Properties
Error List
Entire Solution
0 Errors
0 Warnings
0 Messages
Build + IntelliSense
Search Error List
Description
Project
File
Line
Output
Ready
Ln 7
Col 9
Ch 9
INS


AssemblerApplication3 - AtmelStudio
Standard Mode
Quick Launch (Ctrl+Q)
File Edit View VAssistX ASF Project Build Debug Tools Window Help
Debug
Debug Browser
Hex
ATmega16A
None on
AssemblerApplication3*
main.asm*
Build
Build Events
Toolchain
Device
Tool*
Packs
Advanced
Configuration: N/A
Platform: N/A
Selected debugger/programmer
Programming settings
Erase entire chip
Preserve EEPROM
Debug settings
Keep timers running in stop mode
Cache all flash memory except
ASF Explorer
ASF E...
VA Vi...
VA O...
Soluti...
Properties
Error List
Entire Solution
0 Errors
0 Warnings
0 Messages
Build + IntelliSense
Search Error List
Description
Project
File
Line
Output
Ready

Debugging

Select Simulator

Click on Tools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Advanced
Configuration: N/A
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Search Solution Explorer (Ctrl+;
Solution 'AssemblerApplication7
AssemblerApplication7
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Labels
Output Files
main.asm
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Build + IntelliSense
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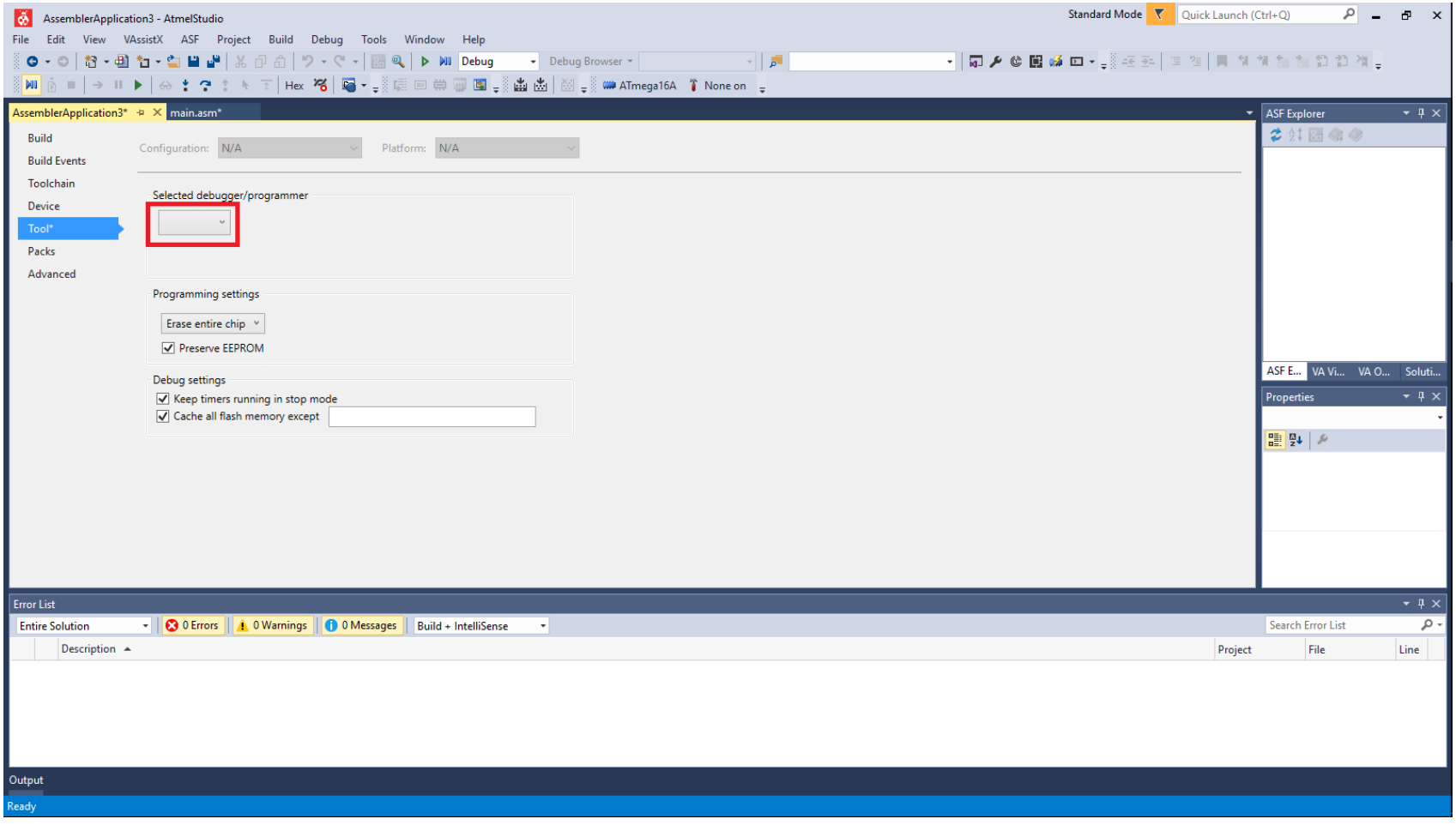
Line
Output
Ready

Debugging

Select Simulator

Select **Simulator** in "Selected debugger/programmer"

Save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main.asm*
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Configuration: N/A
Platform: N/A
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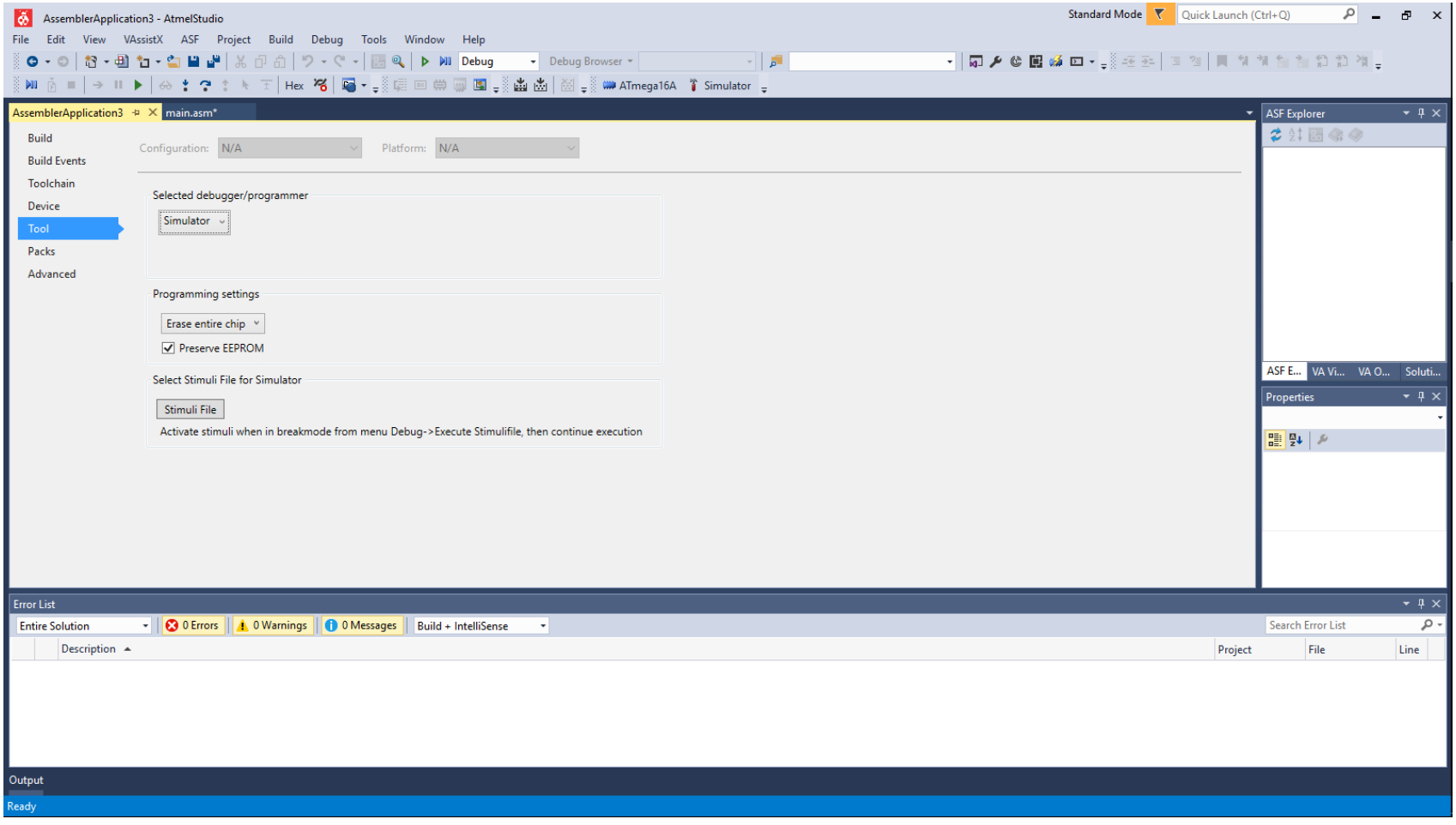
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AssemblerApplication3
main.asm*
Build
Build Events
Toolchain
Device
Tool
Packs
Advanced
Configuration: N/A
Platform: N/A
Selected debugger/programmer
Simulator
Programming settings
Erase entire chip
Preserve EEPROM
Select Stimuli File for Simulator
Stimuli File
Activate stimuli when in breakmode from menu Debug->Execute Stimulifile, then continue execution
ASF Explorer
ASF E...
VA Vi...
VA O...
Soluti...
Properties
Error List
Entire Solution
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File
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Output
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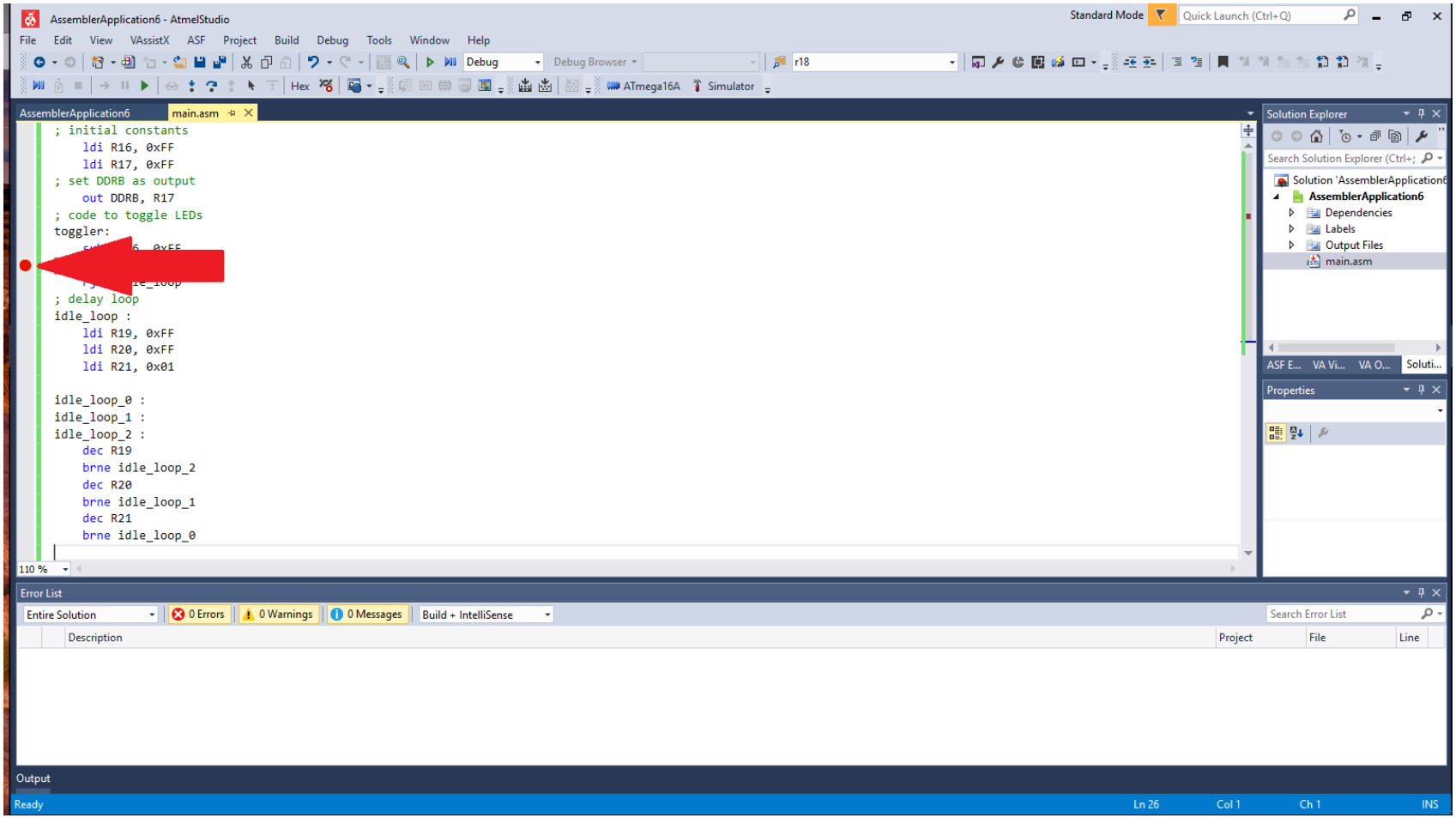
Debugging

Initialize Debugging

Add a breakpoint by clicking in grey panel left to code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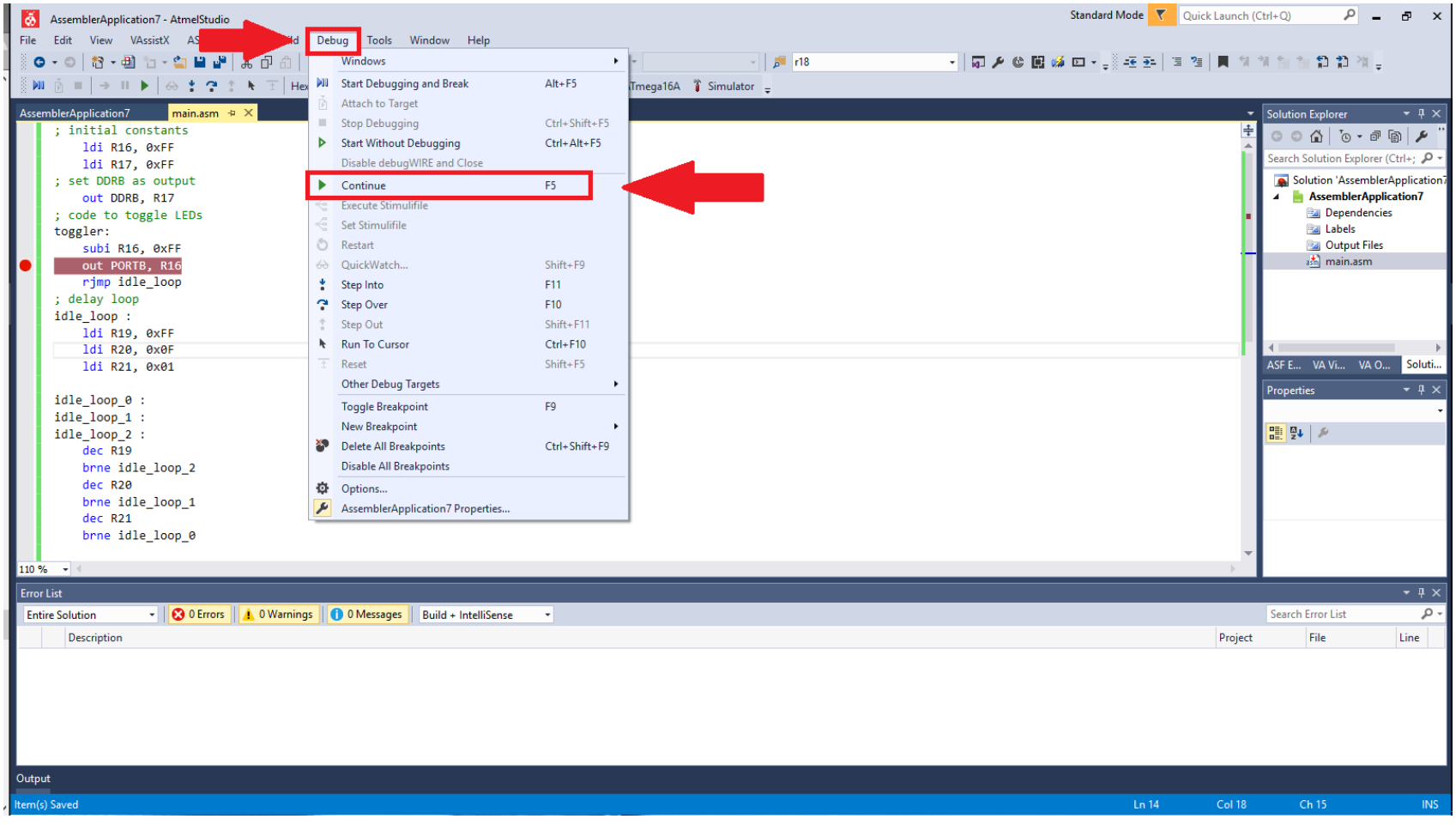
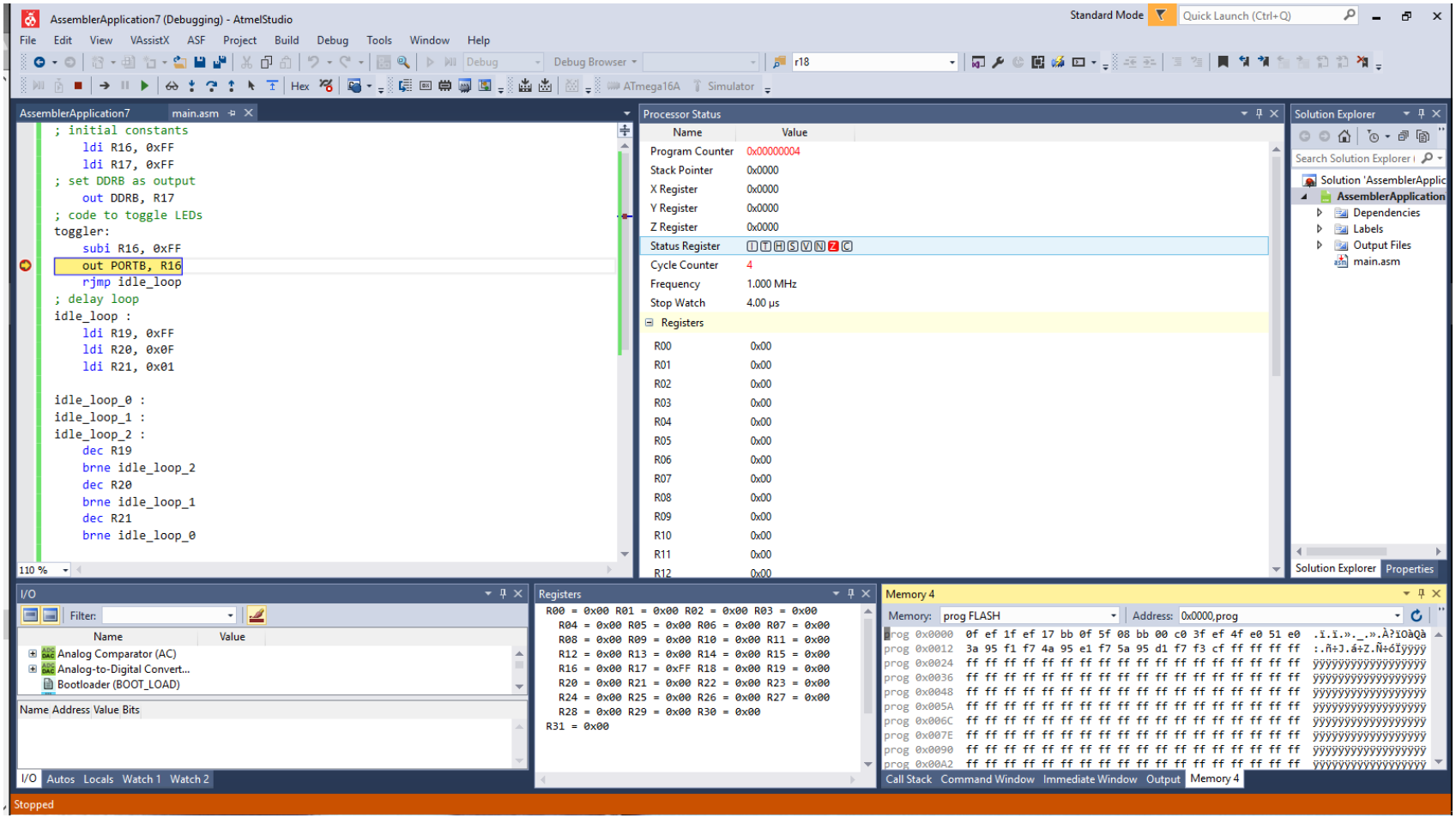
ldi R17, 0xFF
; set DDRB as output
out DDRB, R17
; code to toggle LEDs
toggler:
; delay loop
idle_loop :
ldi R19, 0xFF
ldi R20, 0xFF
ldi R21, 0x01
idle_loop_0 :
idle_loop_1 :
idle_loop_2 :
dec R19
brne idle_loop_2
dec R20
brne idle_loop_1
dec R21
brne idle_loop_0
110 %
Solution Explorer
Search Solution Explorer (Ctrl+;
Solution 'AssemblerApplication6'
AssemblerApplication6
Dependencies
Labels
Output Files
main.asm
ASF E... VA Vi... VA O... Soluti...
Properties
Error List
Entire Solution
0 Errors
0 Warnings
0 Messages
Build + IntelliSense
Search Error List
Description
Project
File
Line
Output
Ready
Ln 26
Col 1
Ch 1
INS

Initialize Debugging

Debug > Continue

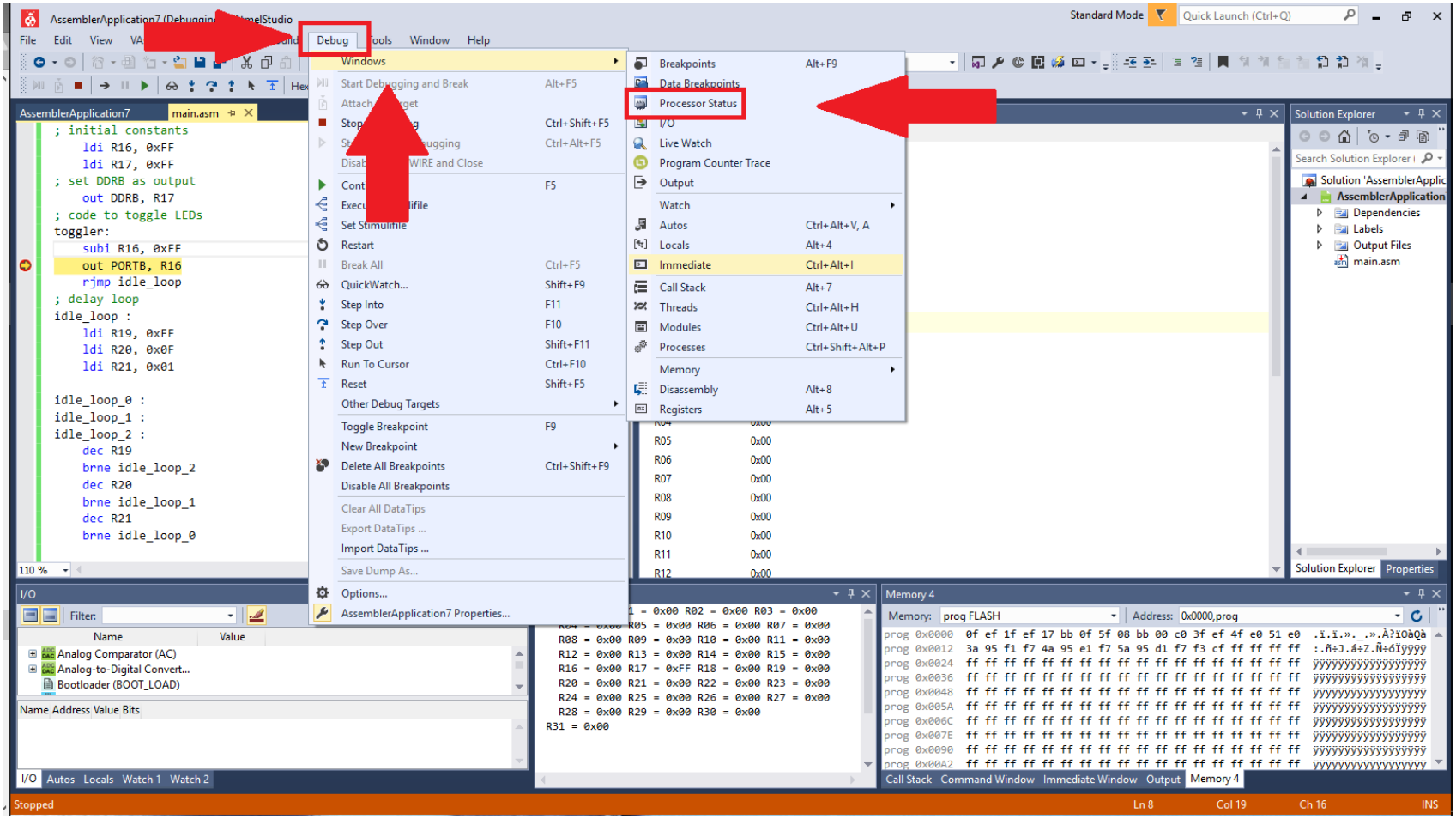

AssemblerApplication7 - AtmelStudio
Standard Mode
Quick Launch (Ctrl+Q)
File Edit View VAssistX AS Debug Tools Window Help
Windows
Start Debugging and Break Alt+F5
Attach to Target
Stop Debugging Ctrl+Shift+F5
Start Without Debugging Ctrl+Alt+F5
Disable debugWIRE and Close
Continue F5
Execute Stimulifile
Set Stimulifile
Restart
QuickWatch... Shift+F9
Step Into F11
Step Over F10
Step Out Shift+F11
Run To Cursor Ctrl+F10
Reset Shift+F5
Other Debug Targets
Toggle Breakpoint F9
New Breakpoint
Delete All Breakpoints Ctrl+Shift+F9
Disable All Breakpoints
Options...
AssemblerApplication7 Properties...
AssemblerApplication7
main.asm
; initial constants
ldi R16, 0xFF
ldi R17, 0xFF
; set DDRB as output
out DDRB, R17
; code to toggle LEDs
toggler:
subi R16, 0xFF
out PORTB, R16
rjmp idle_loop
; delay loop
idle_loop :
ldi R19, 0xFF
ldi R20, 0x0F
ldi R21, 0x01
idle_loop_0 :
idle_loop_1 :
idle_loop_2 :
dec R19
brne idle_loop_2
dec R20
brne idle_loop_1
dec R21
brne idle_loop_0
Solution Explorer
Search Solution Explorer (Ctrl+;
Solution 'AssemblerApplication7'
AssemblerApplication7
Dependencies
Labels
Output Files
main.asm
Properties
Error List
Entire Solution
0 Errors
0 Warnings
0 Messages
Build + IntelliSense
Search Error List
Description
Project
File
Line
Output
Item(s) Saved
Ln 14
Col 18
Ch 15
INS

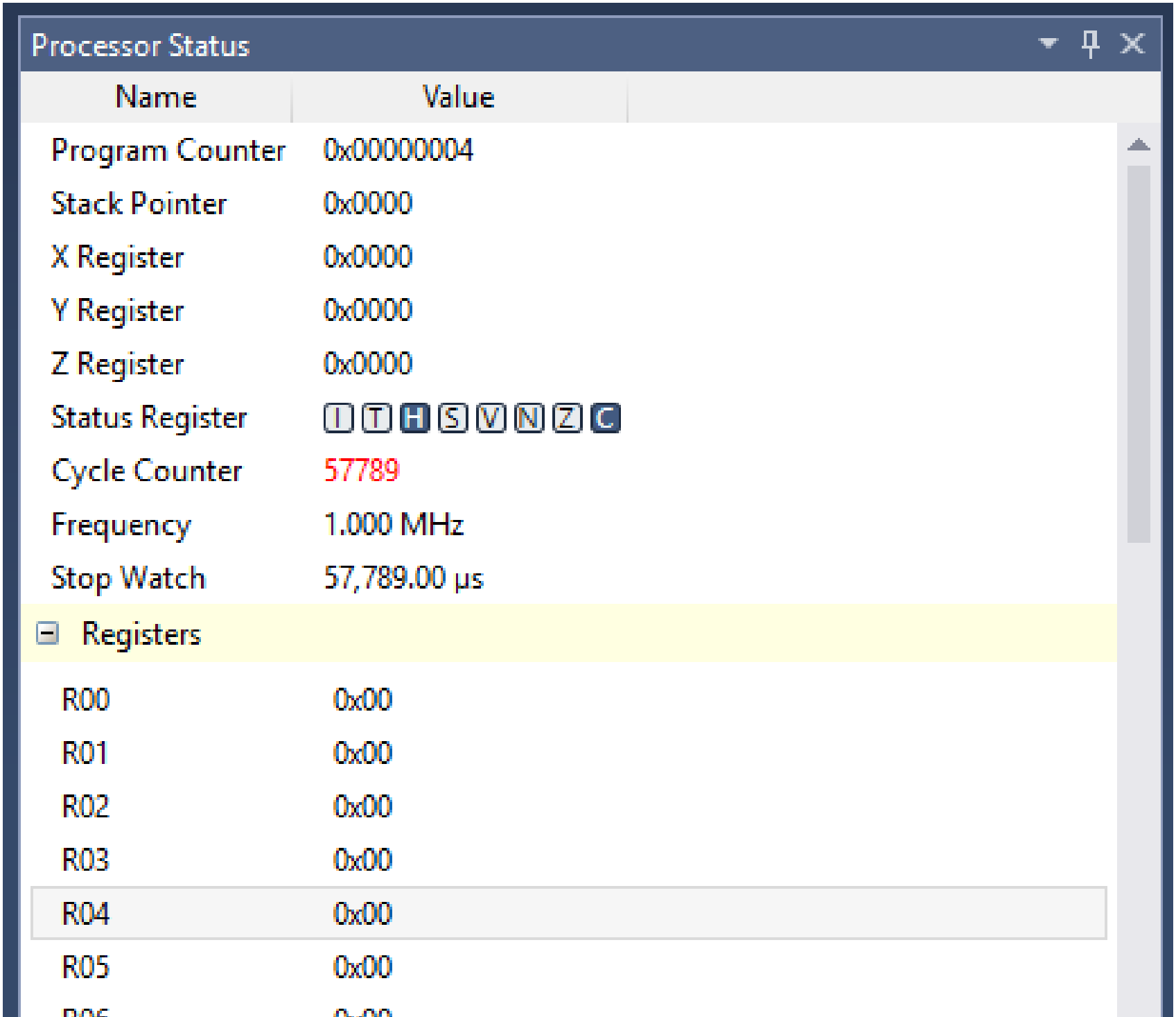

AssemblerApplication7 (Debugging) - AtmelStudio
Standard Mode
Quick Launch (Ctrl+Q)
File Edit View VAssistX ASF Project Build Debug Tools Window Help
Debug
Debug Browser
r18
Hex
ATmega16A
Simulator
AssemblerApplication7
main.asm
; initial constants
ldi R16, 0xFF
ldi R17, 0xFF
; set DDRB as output
out DDRB, R17
; code to toggle LEDs
toggler:
subi R16, 0xFF
out PORTB, R16
rjmp idle_loop
; delay loop
idle_loop :
ldi R19, 0xFF
ldi R20, 0x0F
ldi R21, 0x01
idle_loop_0 :
idle_loop_1 :
idle_loop_2 :
dec R19
brne idle_loop_2
dec R20
brne idle_loop_1
dec R21
brne idle_loop_0
110 %
Processor Status
Name
Value
Program Counter
0x00000004
Stack Pointer
0x0000
X Register
0x0000
Y Register
0x0000
Z Register
0x0000
Status Register
I T H S V N Z C
Cycle Counter
4
Frequency
1.000 MHz
Stop Watch
4.00 µs
Registers
R00
0x00
R01
0x00
R02
0x00
R03
0x00
R04
0x00
R05
0x00
R06
0x00
R07
0x00
R08
0x00
R09
0x00
R10
0x00
R11
0x00
R12
0x00
Solution Explorer
Search Solution Explorer
Solution 'AssemblerApplic
AssemblerApplication
Dependencies
Labels
Output Files
main.asm
Solution Explorer
Properties
I/O
Filter:
Name
Value
Analog Comparator (AC)
Analog-to-Digital Convert...
Bootloader (BOOT_LOAD)
Name Address Value Bits
I/O
Autos
Locals
Watch 1
Watch 2
Registers
R00 = 0x00 R01 = 0x00 R02 = 0x00 R03 = 0x00
R04 = 0x00 R05 = 0x00 R06 = 0x00 R07 = 0x00
R08 = 0x00 R09 = 0x00 R10 = 0x00 R11 = 0x00
R12 = 0x00 R13 = 0x00 R14 = 0x00 R15 = 0x00
R16 = 0x00 R17 = 0xFF R18 = 0x00 R19 = 0x00
R20 = 0x00 R21 = 0x00 R22 = 0x00 R23 = 0x00
R24 = 0x00 R25 = 0x00 R26 = 0x00 R27 = 0x00
R28 = 0x00 R29 = 0x00 R30 = 0x00
R31 = 0x00
Memory 4
Memory:
prog FLASH
Address:
0x0000,prog
prog 0x0000 0f ef 1f ef 17 bb 0f 5f 08 bb 00 c0 3f ef 4f e0 51 e0 .ï.ï.».._.».À?ïOàQà
prog 0x0012 3a 95 f1 f7 4a 95 e1 f7 5a 95 d1 f7 f3 cf ff ff ff ff :.ñ÷J.á÷Z.Ñ÷óÏÿÿÿÿ
prog 0x0024 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x0036 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x0048 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x005A ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x006C ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x007E ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x0090 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x00A2 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
Call Stack
Command Window
Immediate Window
Output
Memory 4
Stopped

Debugging

Processor Status

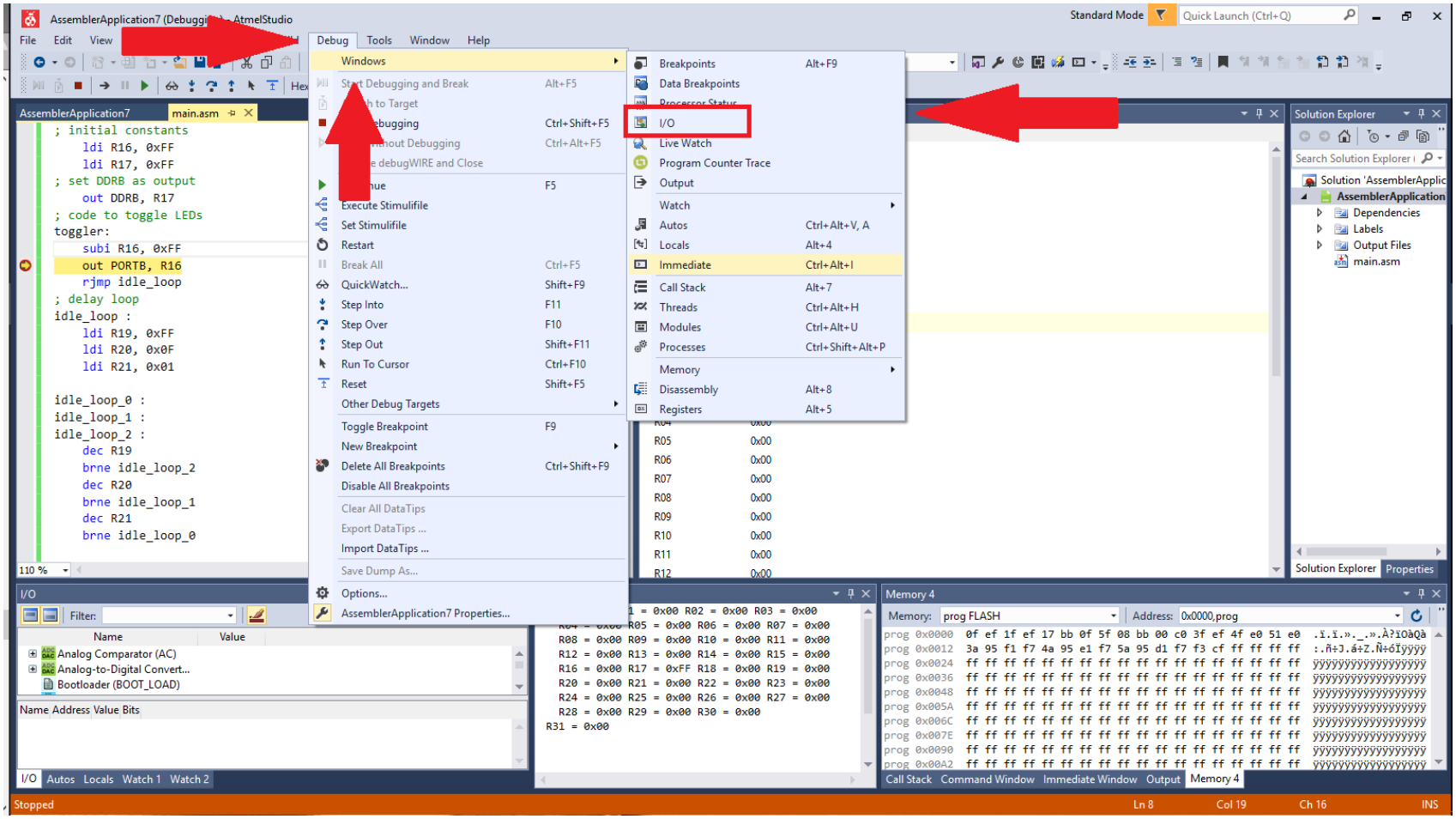
Debug > Windows > Processor Status

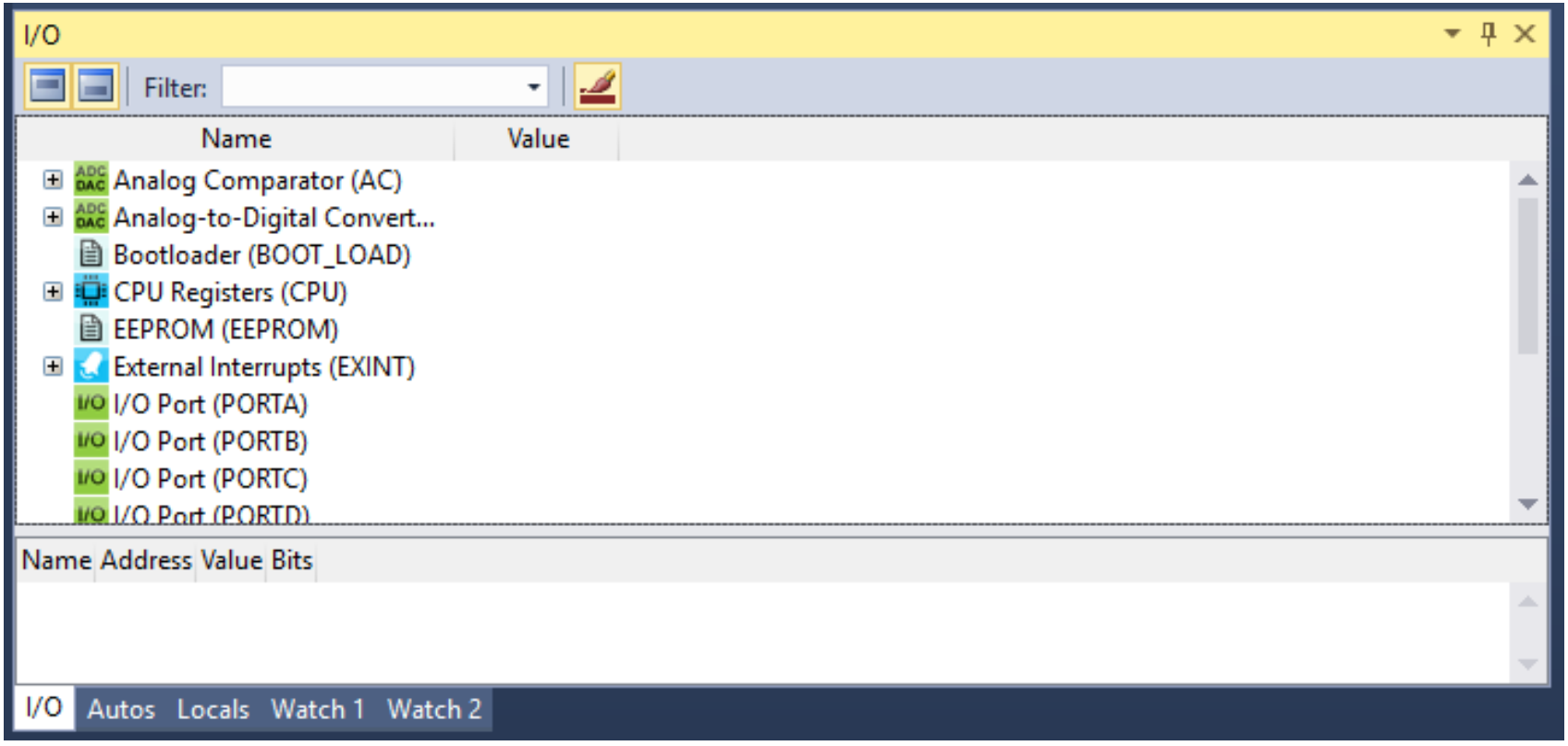

Debug
Windows
Processor Status
Breakpoints
Data Breakpoints
I/O
Live Watch
Program Counter Trace
Output
Watch
Autos
Locals
Immediate
Call Stack
Threads
Modules
Processes
Memory
Disassembly
Registers
Start Debugging and Break
Stop
Restart
Break All
QuickWatch...
Step Into
Step Over
Step Out
Run To Cursor
Reset
Other Debug Targets
Toggle Breakpoint
New Breakpoint
Delete All Breakpoints
Disable All Breakpoints
Clear All DataTips
Export DataTips ...
Import DataTips ...
Save Dump As...
Options...
AssemblerApplication7 Properties...
AssemblerApplication7
main.asm
; initial constants
ldi R16, 0xFF
ldi R17, 0xFF
; set DDRB as output
out DDRB, R17
; code to toggle LEDs
toggler:
subi R16, 0xFF
out PORTB, R16
rjmp idle_loop
; delay loop
idle_loop :
ldi R19, 0xFF
ldi R20, 0x0F
ldi R21, 0x01
idle_loop_0 :
idle_loop_1 :
idle_loop_2 :
dec R19
brne idle_loop_2
dec R20
brne idle_loop_1
dec R21
brne idle_loop_0
Solution Explorer
Search Solution Explorer
AssemblerApplication
Dependencies
Labels
Output Files
main.asm
I/O
Filter:
Name
Value
Analog Comparator (AC)
Analog-to-Digital Convert...
Bootloader (BOOT_LOAD)
Memory 4
Memory: prog FLASH
Address: 0x0000,prog
Stopped
Ln 8
Col 19
Ch 16
INS


Processor Status
Name
Value
Program Counter
0x00000004
Stack Pointer
0x0000
X Register
0x0000
Y Register
0x0000
Z Register
0x0000
Status Register
I T H S V N Z C
Cycle Counter
57789
Frequency
1.000 MHz
Stop Watch
57,789.00 µs
Registers
R00
0x00
R01
0x00
R02
0x00
R03
0x00
R04
0x00
R05
0x00

Debugging
I/O

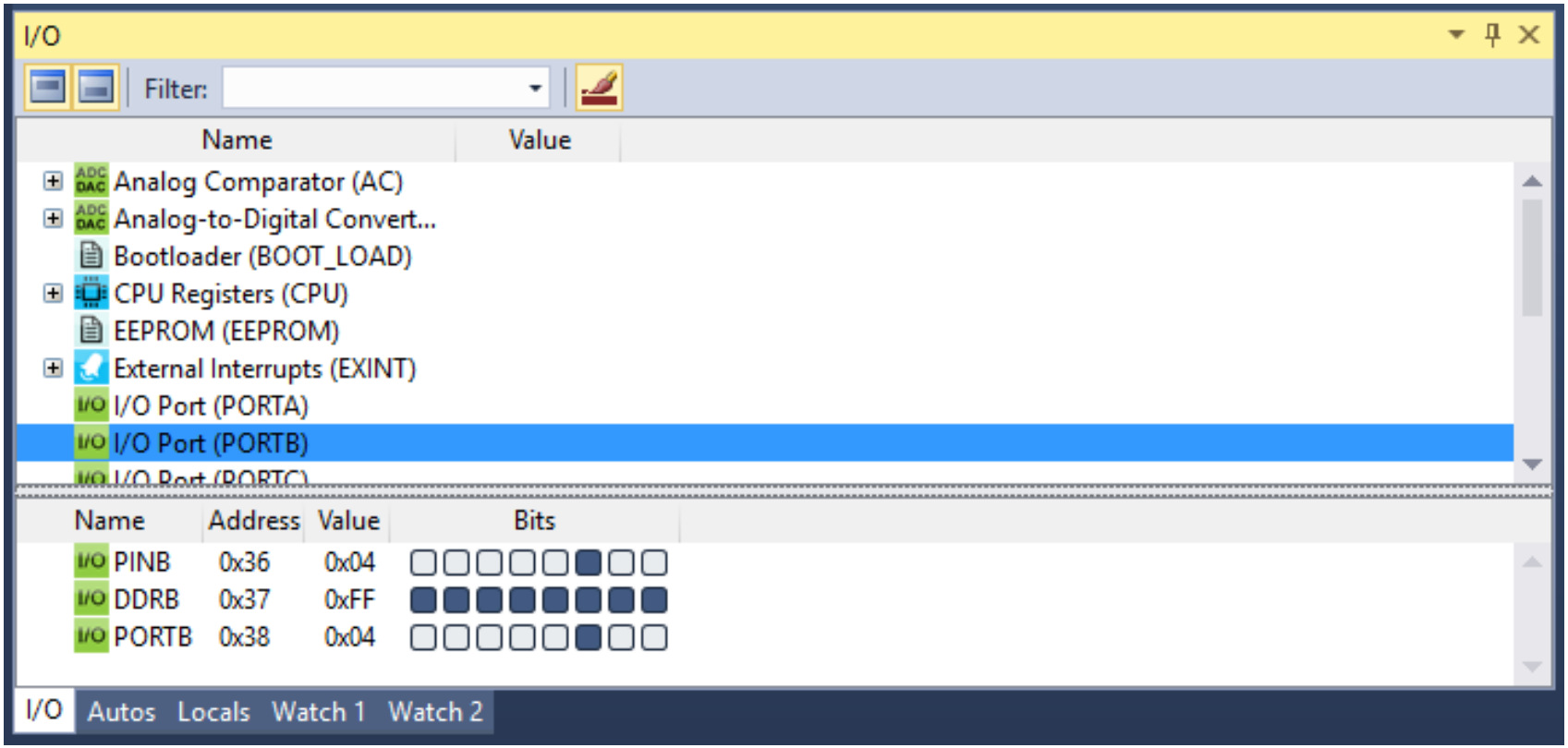
Debug > Windows > I/O


AssemblerApplication7 (Debugging) - AtmelStudio
Standard Mode
Quick Launch (Ctrl+Q)
File Edit View
Debug Tools Window Help
Windows
Start Debugging and Break Alt+F5
Start Without Debugging Ctrl+Alt+F5
Execute Stimulifile
Set Stimulifile
Restart
Break All Ctrl+F5
QuickWatch... Shift+F9
Step Into F11
Step Over F10
Step Out Shift+F11
Run To Cursor Ctrl+F10
Reset Shift+F5
Other Debug Targets
Toggle Breakpoint F9
New Breakpoint
Delete All Breakpoints Ctrl+Shift+F9
Disable All Breakpoints
Clear All DataTips
Export DataTips ...
Import DataTips ...
Save Dump As...
Options...
AssemblerApplication7 Properties...
Breakpoints Alt+F9
Data Breakpoints
Processor Status
I/O
Live Watch
Program Counter Trace
Output
Watch
Autos Ctrl+Alt+V, A
Locals Alt+4
Immediate Ctrl+Alt+I
Call Stack Alt+7
Threads Ctrl+Alt+H
Modules Ctrl+Alt+U
Processes Ctrl+Shift+Alt+P
Memory
Disassembly Alt+8
Registers Alt+5
AssemblerApplication7
main.asm
; initial constants
ldi R16, 0xFF
ldi R17, 0xFF
; set DDRB as output
out DDRB, R17
; code to toggle LEDs
toggler:
subi R16, 0xFF
out PORTB, R16
rjmp idle_loop
; delay loop
idle_loop :
ldi R19, 0xFF
ldi R20, 0x0F
ldi R21, 0x01
idle_loop_0 :
idle_loop_1 :
idle_loop_2 :
dec R19
brne idle_loop_2
dec R20
brne idle_loop_1
dec R21
brne idle_loop_0
110 %
Solution Explorer
Search Solution Explorer
Solution 'AssemblerApplic
AssemblerApplication
Dependencies
Labels
Output Files
main.asm
Solution Explorer Properties
R05 0x00
R06 0x00
R07 0x00
R08 0x00
R09 0x00
R10 0x00
R11 0x00
R12 0x00
I/O
Filter:
Name Value
Analog Comparator (AC)
Analog-to-Digital Convert...
Bootloader (BOOT_LOAD)
Name Address Value Bits
I/O Autos Locals Watch 1 Watch 2
R31 = 0x00
Memory 4
Memory: prog FLASH
Address: 0x0000,prog
prog 0x0000 0f ef 1f ef 17 bb 0f 5f 08 bb 00 c0 3f ef 4f e0 51 e0
prog 0x0012 3a 95 f1 f7 4a 95 e1 f7 5a 95 d1 f7 f3 cf ff ff ff ff
prog 0x0024 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
prog 0x0036 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
prog 0x0048 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
prog 0x005A ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
prog 0x006C ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
prog 0x007E ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
prog 0x0090 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
prog 0x00A2 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
Call Stack Command Window Immediate Window Output Memory 4
Stopped
Ln 8 Col 19 Ch 16 INS


I/O
Filter:
Name
Value
Analog Comparator (AC)
Analog-to-Digital Convert...
Bootloader (BOOT_LOAD)
CPU Registers (CPU)
EEPROM (EEPROM)
External Interrupts (EXINT)
I/O Port (PORTA)
I/O Port (PORTB)
I/O Port (PORTC)
I/O Port (PORTD)
Name
Address
Value
Bits
I/O
Autos
Locals
Watch 1
Watch 2

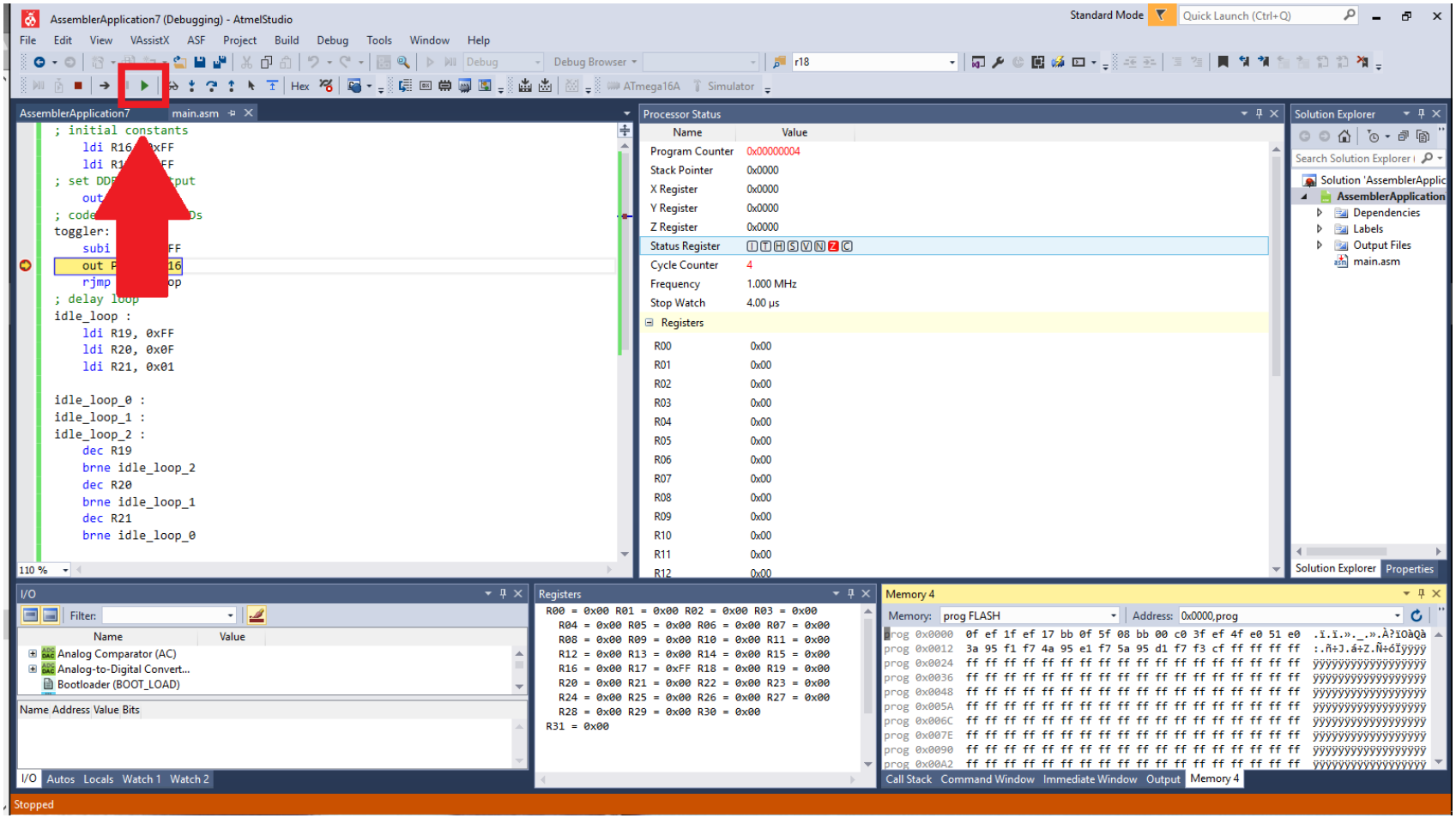
Debugging
I/O

Select relevant port


I/O
Filter:
Name
Value
Analog Comparator (AC)
Analog-to-Digital Convert...
Bootloader (BOOT_LOAD)
CPU Registers (CPU)
EEPROM (EEPROM)
External Interrupts (EXINT)
I/O Port (PORTA)
I/O Port (PORTB)
Name
Address
Value
Bits
PINB 0x36 0x04
DDRB 0x37 0xFF
PORTB 0x38 0x04
I/O
Autos
Locals
Watch 1
Watch 2

Debugging
I/O

Press **Continue** button to execute code till next breakpoint or end of execution


AssemblerApplication7 (Debugging) - AtmelStudio
Standard Mode
Quick Launch (Ctrl+Q)
File Edit View VAssistX ASF Project Build Debug Tools Window Help
Debug
Debug Browser
r18
Hex
ATmega16A
Simulator
AssemblerApplication7
main.asm
; initial constants
ldi R16, 0xFF
ldi R17, 0xFF
; set DDRB as output
out DDRB, R16
; code to toggle LEDs
toggler:
subi R16, 0xFF
out PORTB, R16
rjmp toggler
; delay loop
idle_loop :
ldi R19, 0xFF
ldi R20, 0x0F
ldi R21, 0x01
idle_loop_0 :
idle_loop_1 :
idle_loop_2 :
dec R19
brne idle_loop_2
dec R20
brne idle_loop_1
dec R21
brne idle_loop_0
110 %
Processor Status
Name
Value
Program Counter
0x00000004
Stack Pointer
0x0000
X Register
0x0000
Y Register
0x0000
Z Register
0x0000
Status Register
I T H S V N Z C
Cycle Counter
4
Frequency
1.000 MHz
Stop Watch
4.00 µs
Registers
R00 0x00
R01 0x00
R02 0x00
R03 0x00
R04 0x00
R05 0x00
R06 0x00
R07 0x00
R08 0x00
R09 0x00
R10 0x00
R11 0x00
R12 0x00
Solution Explorer
Search Solution Explorer
Solution 'AssemblerApplic
AssemblerApplication
Dependencies
Labels
Output Files
main.asm
Solution Explorer
Properties
I/O
Filter:
Name
Value
Analog Comparator (AC)
Analog-to-Digital Convert...
Bootloader (BOOT_LOAD)
Name Address Value Bits
I/O
Autos
Locals
Watch 1
Watch 2
Registers
R00 = 0x00 R01 = 0x00 R02 = 0x00 R03 = 0x00
R04 = 0x00 R05 = 0x00 R06 = 0x00 R07 = 0x00
R08 = 0x00 R09 = 0x00 R10 = 0x00 R11 = 0x00
R12 = 0x00 R13 = 0x00 R14 = 0x00 R15 = 0x00
R16 = 0x00 R17 = 0xFF R18 = 0x00 R19 = 0x00
R20 = 0x00 R21 = 0x00 R22 = 0x00 R23 = 0x00
R24 = 0x00 R25 = 0x00 R26 = 0x00 R27 = 0x00
R28 = 0x00 R29 = 0x00 R30 = 0x00
R31 = 0x00
Memory 4
Memory:
prog FLASH
Address:
0x0000,prog
prog 0x0000 0f ef 1f ef 17 bb 0f 5f 08 bb 00 c0 3f ef 4f e0 51 e0 .ï.ï.».._.».À?ïOàQà
prog 0x0012 3a 95 f1 f7 4a 95 e1 f7 5a 95 d1 f7 f3 cf ff ff ff ff :.ñ÷J.á÷Z.Ñ÷óÏÿÿÿÿ
prog 0x0024 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x0036 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x0048 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x005A ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x006C ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x007E ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x0090 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
prog 0x00A2 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
Call Stack
Command Window
Immediate Window
Output
Memory 4
Stopped

Debugging
I/O

Thank You ☺