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# Software development tools STM32 and STM8 microcontrollers

January 2021



## Software Development Tools - Overview

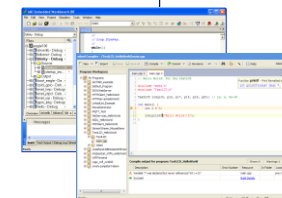


## MCU/MPU Selection and Configuration



## Integrated Development Environments

For **STM32**



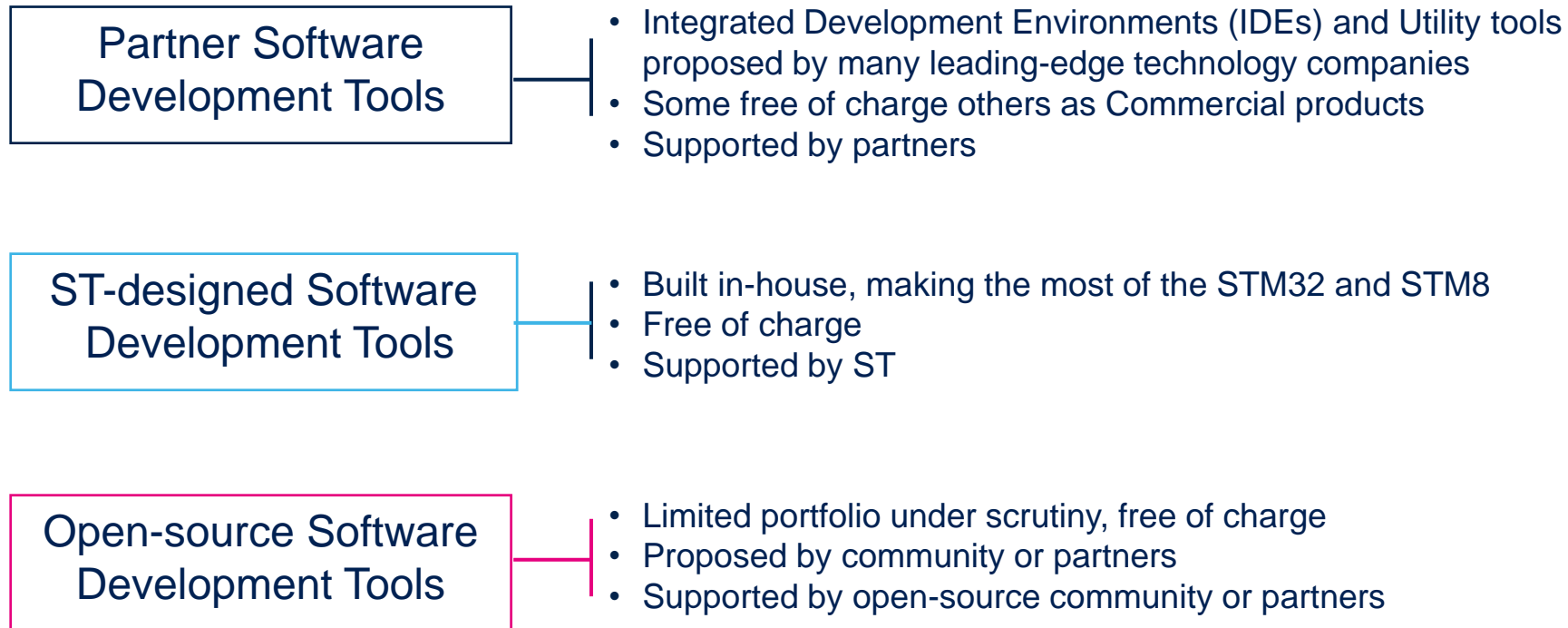
For **STM8**

## MCU Utility Tools



# A rich portfolio

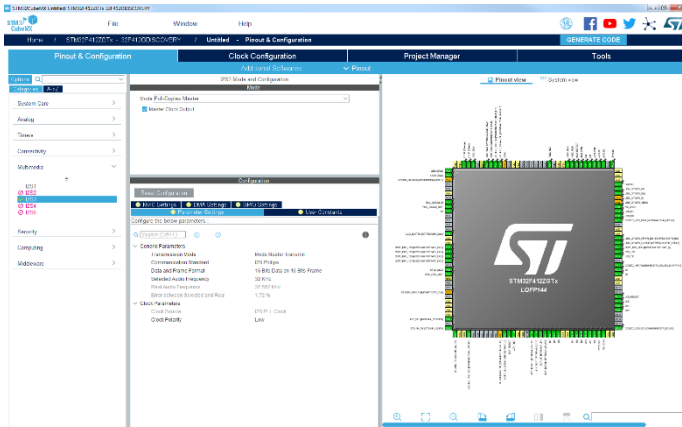
- Extensive Software Development Tool ecosystem around the STM32 and STM8
- You will find your solution, fitting your requirements in terms of price, feature, license scheme and support



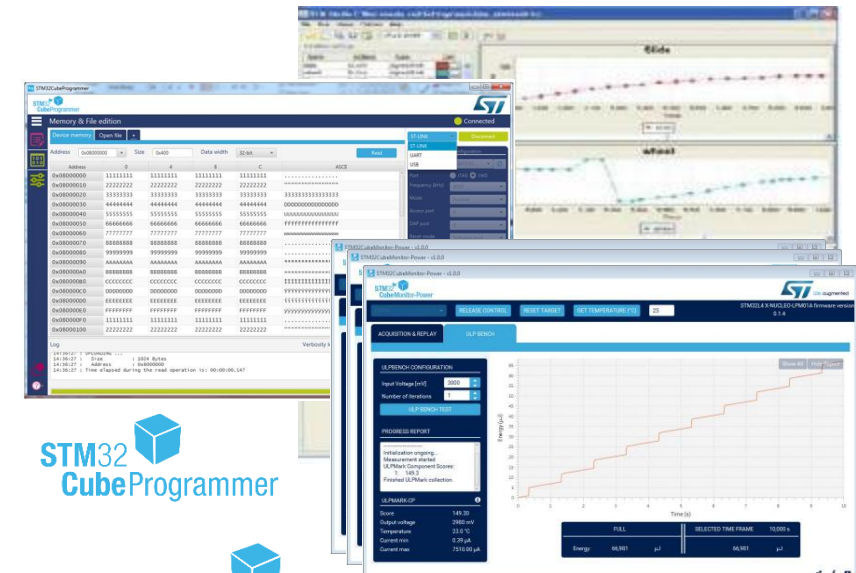
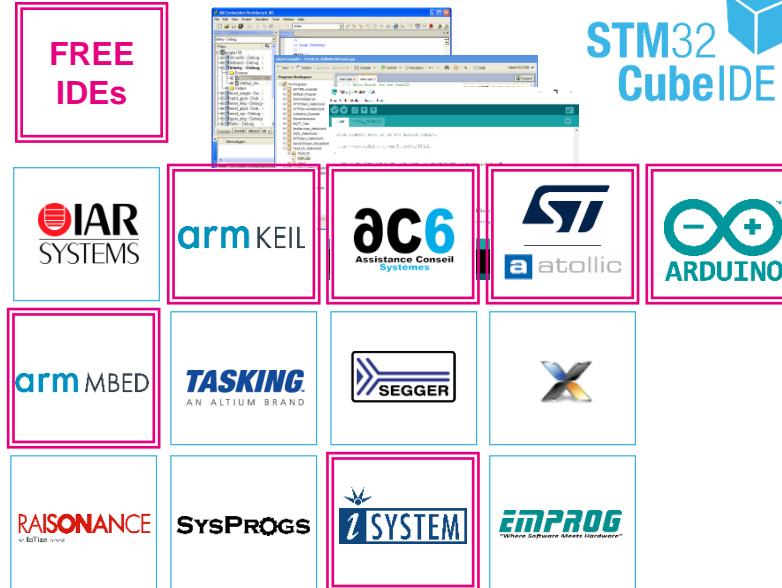


# STM32 MCU overview

## A C/C++ flow in three steps



FREE  
IDEs



**STM32CubeMX, GUI Builders**  
Configure & Generate Code

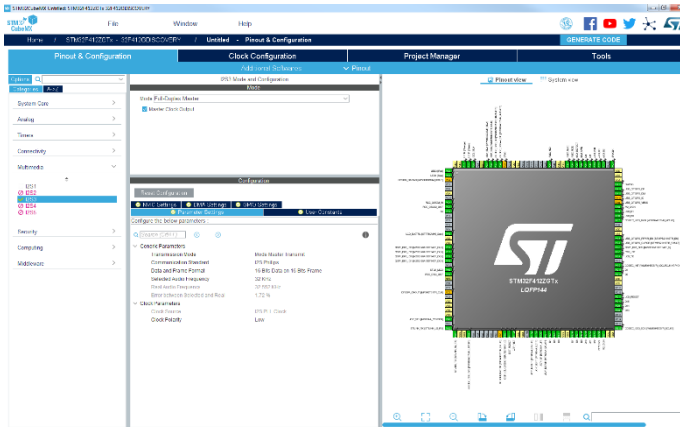
**ST and Partner IDEs**  
Compile and Debug

**STM32CubeProgrammer/Monitor**  
Monitor, Program & Utilities

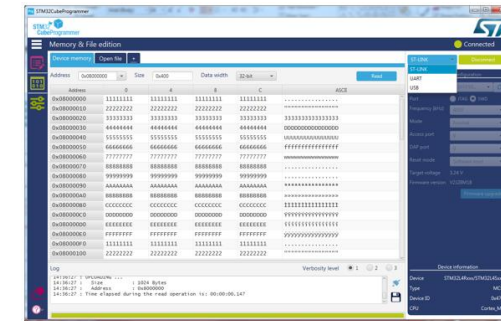
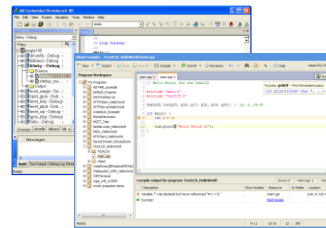


# STM32 MPU overview

## A C/C++ flow in three steps



FREE  
tools



**STM32CubeMX**  
Configure & Generate Code

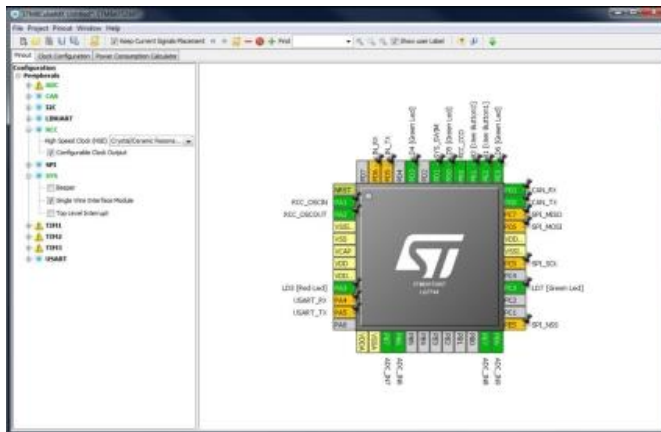
**ST and Partner tools**  
Compile and Debug

**STM32CubeProgrammer**  
Program



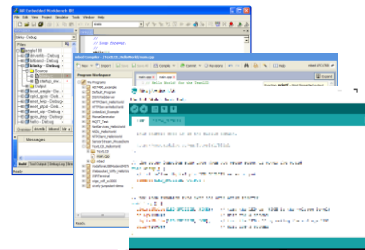
# STM8 overview

## A C/C++ flow in three steps

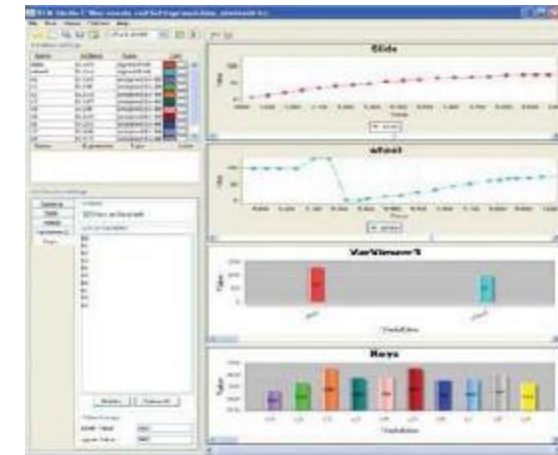


**STM8CubeMX**  
Configure

**FREE  
IDEs**



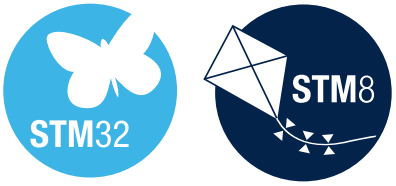
**ST and Partner IDEs**  
Compile and Debug



**STVP, STLink-Util., STMStudio**  
Monitor & Program

# MCU/MPU selection and configuration





# Selection and configuration

Free ST Tool	STM32		STM8	Description
	MCU	MPU		
<a href="#">ST-MCU-Finder</a>	✓	✓	✓	Utility to select the MCU or MPU that best fits your application. Available for smartphone, tablet, and PC.
<a href="#">STM8CubeMX</a>			✓	STM8 Micro eXplorer, hardware and software configurator, project configuration reporter, and power consumption calculator
<a href="#">STM32CubeMX</a>	✓	✓		STM32 Micro eXplorer, hardware and software configurator, project and code generator, power consumption calculator and embedding free ST GUI builders (TouchGFX and STemWin) for MCU and a DDR tuning tool for MPU
<a href="#">STM32 Clock configurators</a>	✓			STM32 legacy device clock configurators



# STM32 MCU IDE portfolio





# A large community of IDE providers

Offering general-purpose, free IDEs



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# A large community of IDE providers

Offering special-purpose, free IDEs



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# A large community of IDE providers

Offering general-purpose, commercial IDEs





# A large community of IDE providers

A complete offer of general-purpose and special-purpose, free and commercial IDEs




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# STM32 free IDEs

Provider	Product and labels	Cores	Framework		Purpose		Compiler	Debugger	Win	Linux	OS X
			Proprietary	Eclipse	General	Specific					
STMicroelectronics	<a href="#">STM32CubeIDE</a>	All		✓	✓		gcc	gdb / OpenOCD	✓	✓	✓
ac6	<a href="#">System Workbench (SW4STM32)</a>	All		✓	✓		gcc	OpenOCD	✓	✓	✓
Atollic	<a href="#">Atollic TrueSTUDIO</a>	All		✓	✓		gcc	gdb	✓	✓	
iSystem	<a href="#">iSYS-WinIDEAOpen</a>	All	✓		✓		gcc	gdb	✓		
Arm KEIL	<a href="#">MDK5-Cortex-M</a> 	M0, M0+	✓		✓		llvm/ARM	uVision	✓		
Arduino	<a href="#">Arduino IDE</a>	All	✓			✓	gcc		✓	✓	✓
Arm MBED	<a href="#">Mbed Studio</a>	All	✓			✓	ARM		✓	✓	✓

Framework and Purpose descriptions are available in this [section](#).  
Basic IDE selection criteria are described [here](#).



# STM32 commercial IDEs

Provider	Product and labels	Cores	Framework		Compiler	Debugger	Win	Linux	OS X	Safety edition	Free edition or use, limitation
			Proprietary	Eclipse							
IAR Systems	<a href="#">EWARM</a> <small>MadeForSTM32 V1</small>	All	✓		IAR	IAR	✓			✓	Code limit: 32KB
Arm KEIL	<a href="#">MDK5-Cortex-M</a> <small>MadeForSTM32 V1</small>	All	✓		llvm / ARM	uVision	✓			✓	Code limit: 32KB
Emprog	<a href="#">ThunderBench</a>	All		✓	gcc	OpenOCD	✓				Time limit: 30-day
iSystem	<a href="#">iSYS-WinIDEA</a>	All	✓		gcc, others	gdb	✓				<a href="#">WinIDEAOpen</a>
Raisonance	<a href="#">Raisonance Ride7</a>	All	✓		gcc	gdb	✓				No
Rowley	<a href="#">CrossWorks</a>	All	✓		gcc	Rowley	✓	✓	✓		Time limit: 30-day
Segger	<a href="#">Embedded Studio</a>	All	✓		gcc / llvm	Segger	✓	✓	✓		Build/Run warning
SysProgs	<a href="#">VisualGDB Embedded</a>	All	✓		gcc / llvm	OpenOCD	✓	✓			Time limit: 30-day
Tasking	<a href="#">TaskingVX</a>	All		✓	Tasking	Tasking	✓	✓	✓		On request
Cosmic	<a href="#">IDEA</a>	All	✓		Cosmic	Cosmic	✓				Code limit: 32KB
Green hills	<a href="#">MultiIDE</a>	All	✓		Green hills	Green hills	✓	✓			

Free edition highlights the most attractive option when either time or size limited editions are available.  
Full details available at IDE provider website



# STM32 validated MCU devices

IDE	Validated Device MCU Series															Details here
	F0	F1	F2	F3	F4	F7	G0	G4	H7	H7 Dual Core	L0	L1	L4	L5	WB	
STM32CubeIDE	All															<a href="#">Link</a>
System Workbench (SW4STM32)	All															
Arduino IDE	✓	✓		✓	✓	✓						✓	✓		✓	<a href="#">Forum Link</a>
Arm MBED	✓	✓	✓	✓	✓	✓					✓	✓	✓		✓	<a href="#">Link</a>
Atollic TrueSTUDIO	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓			<a href="#">Link</a>
ThunderBench	✓	✓	✓	✓	✓	✓						✓	✓			<a href="#">Link</a>
EWARM	All															<a href="#">Link</a>
iSYS-WinIDEA	✓	✓	✓	✓	✓	✓			✓		✓	✓	✓			<a href="#">MCUs / Examples</a>
MDK5-Cortex-M	All															<a href="#">Link</a>
Raisonance Ride7	✓	✓	✓	✓	✓	✓						✓				<a href="#">Link</a>
Rowley Associates CrossWorks	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓			<a href="#">MCUs / Boards</a>
Embedded Studio	✓	✓	✓		✓	✓	✓		✓		✓	✓	✓	✓	✓	<a href="#">Link</a>
VisualGDB Embedded		✓	✓	✓	✓	✓					✓	✓	✓			
TaskingVX	✓	✓	✓	✓	✓	✓						✓				<a href="#">Link</a>

Full list of supported and validated boards, STM32 product lines or STM32 devices can be found at the IDE provider websites





# IDE centralized online resources

IDE	YouTube Channel	Forums	Blogs/News/Tutorials					
			Video Tutorials	Webinars	App notes	White papers	Blog	News/Events
STM32CubeIDE	<a href="#">Link</a>	<a href="#">Link</a>	<a href="#">YouTube Link</a>		<a href="#">Link</a>			
System Workbench (SW4STM32)	Scattered Videos	<a href="#">Link</a>				<a href="#">Link</a>	<a href="#">Link</a>	
Arduino IDE	Several Videos	<a href="#">Link</a>	<a href="#">YouTube Link</a>					
Arm MBED	<a href="#">Link</a>	<a href="#">Link</a>					<a href="#">Link</a>	<a href="#">Link</a>
Atollic TrueSTUDIO	<a href="#">Link</a>							
ThunderBench	<a href="#">Link</a>							<a href="#">Link</a>
EWARM	Scattered Videos		<a href="#">Link</a>	Scattered	<a href="#">Link</a>	<a href="#">Link</a>		<a href="#">Link</a>
iSYS-WinIDEA						<a href="#">Link</a>		<a href="#">Link</a>
MDK5-Cortex-M	Scattered Videos	<a href="#">Link</a>		Scattered	<a href="#">Link</a>	<a href="#">Link</a>		<a href="#">Link</a>
Raisonance Ride7		<a href="#">Link</a>						<a href="#">Link</a>
Rowley Associates CrossWorks	<a href="#">Link</a>	<a href="#">Login Link</a>	<a href="#">RSS feed</a>			<a href="#">Link</a>		<a href="#">Link</a>
Embedded Studio	<a href="#">Link</a>	<a href="#">Link</a>					<a href="#">Link</a>	<a href="#">Link</a>
VisualGDB Embedded	Scattered Videos	<a href="#">Link</a>			<a href="#">Link</a>		<a href="#">Link</a>	
TaskingVX	Scattered Videos			<a href="#">Link</a>		<a href="#">Link</a>		<a href="#">Link</a>

Links might be out of date between regular updates of this presentation

# STM32 MPU tool portfolio







# STM32 MPU tool providers

A wide offer of software development tools





# STM32 MPU tools

Provider	Product and labels	Cores	Description	Free edition	Win	Linux	OS X
ac6	<a href="#"><u>System Workbench for Linux (SW4Linux)</u></a>	Cortex-A	Eclipse plug-in	No	✓	✓	✓
Arm	<a href="#"><u>ARM Development Studio</u></a>	All	Heterogeneous core IDE	Time limit: 30-day	✓	✓	
Arm Keil	<a href="#"><u>MDK5-Cortex-M</u></a> 	Cortex-M	Cortex-M limited IDE	Code limit: 32KB	✓		
Crank Software Inc.	<a href="#"><u>Storyboard Designer</u></a>	Cortex-A	Graphical User Interface designer	Trial version	✓	✓	✓
IAR Systems	<a href="#"><u>EWARM</u></a> 	Cortex-M	Cortex-M limited IDE	Code limit: 32KB	✓		
Qt	<a href="#"><u>Qt Development Tools</u></a>	Cortex-A	Graphical User Interface designer and IDE	Trial version			
STMicroelectronics	<a href="#"><u>GPU tool kit</u></a>	Cortex-A	Multi-purpose GPU toolkit	Yes	✓	✓	
	<a href="#"><u>STM32CubeProg</u></a>	All	Flash Programmer	Yes	✓	✓	✓
Timesys	<a href="#"><u>TimeStorm IDE</u></a>	Cortex-A	Cortex-A limited IDE	Time limit: 30-day	✓	✓	

# STM8 IDE portfolio





# STM8 IDE providers

Offering general-purpose, free IDEs





# STM8 IDE providers

Offering special-purpose, free IDEs





# STM8 IDE providers

Offering general-purpose, commercial IDEs







# STM8 IDE providers

A complete offer of general-purpose and special-purpose,  
free and commercial IDEs





# STM8 IDEs

Provider	Product	Framework		Compiler	Debugger	Win	Linux	OS X	Safety edition	Free edition, limitations
		Proprietary	Eclipse							
Cosmic	<a href="#">IDEA</a>	✓		Cosmic	Cosmic	✓				FREE, unlimited
STMicroelectronics	<a href="#">STVD</a>	✓		Cosmic	STMicroelectronics	✓				FREE, unlimited
				Raisonance	STMicroelectronics	✓				Code limit: 2 Kbytes
IAR Systems	<a href="#">EWSTM8</a>	✓		IAR	IAR	✓			✓	Time limit: 30-day Code limit: 8 Kbytes
iSystem	<a href="#">iSYS-WinIDEA</a>	✓		Cosmic	iSystem	✓				Time limit: 30-day
Raisonance	<a href="#">Ride7-STM8</a>	✓		Raisonance	Raisonance	✓				Code limit: 2 Kbytes
Arduino	<a href="#">Arduino IDE</a>	✓		Cosmic		✓				FREE, unlimited

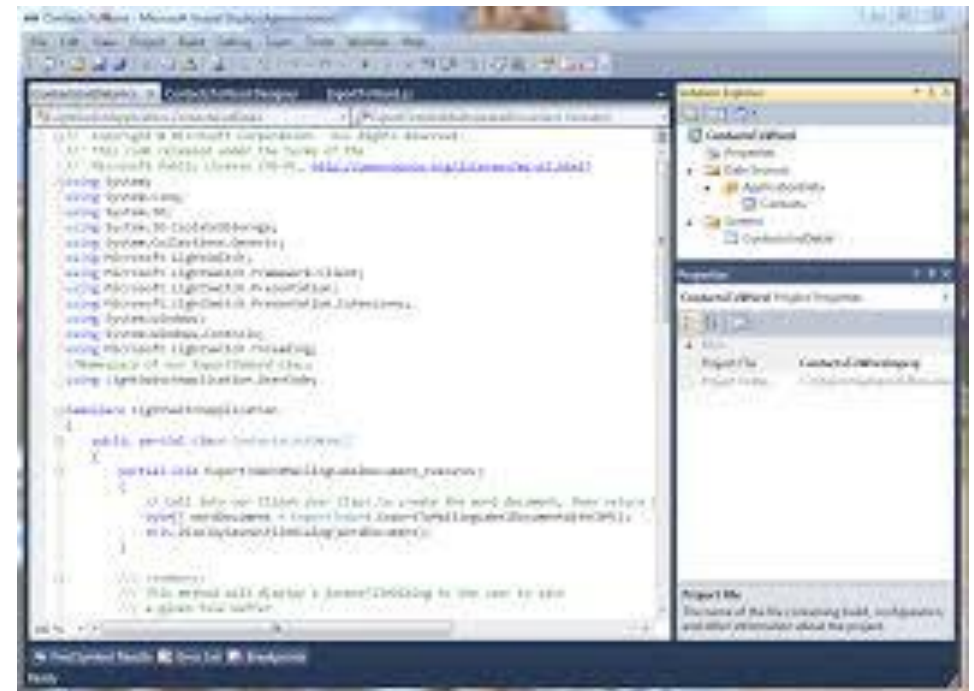
Free edition highlights all options. Several commercial editions may exist.  
Full details available at IDE provider website.

# Additional info about IDE characteristics



# IDE scope

- IDEs allow more or less abstraction on:
  - The build/run/debug tools in use (compiler, linker, ...)
  - Environmental attributes (project structure, optimizations, ....)
  - Programming language attributes (compiled/Interpreted, syntax highlight at editing, ...)
  - User interface (GUI, browser, command line)
  - RTOS and pre-defined APIs and libraries
  - Pre-defined projects, examples or constructs
  - Code versioning and advanced debugging capabilities
  - If code is stored locally or in the cloud
- Most common for STM32 portfolio are general-purpose IDEs
  - Standalone application
  - GUI based
  - C/C++ compiler (GNU gcc, llvm, ARM or proprietary)
  - Common debugger (gdb or OpenOCD)
  - RTOS and C/C++ standard libraries in source form
  - Locally stored

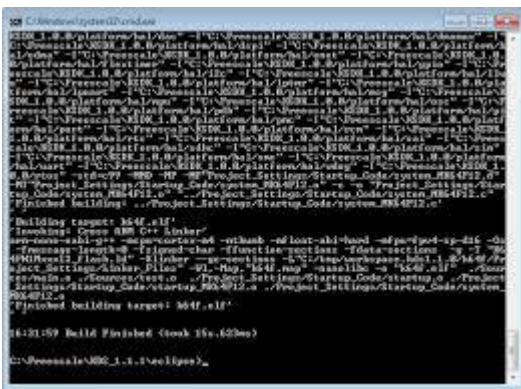


# Special-purpose IDEs




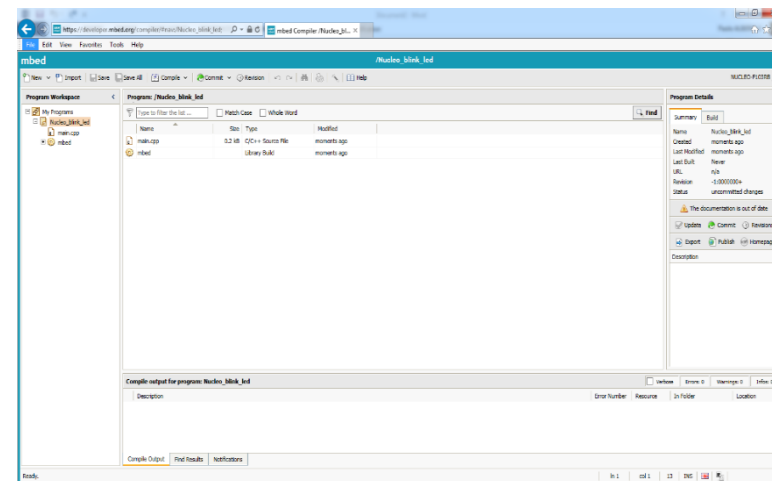
i.e. Arduino

- Special-purpose IDEs can offer:
  - Higher code abstraction level, for beginners
  - Interpreted language option
  - Public library of high-level functions
  - Basic examples (aka 'Sketches')
  - No explicit debug tool



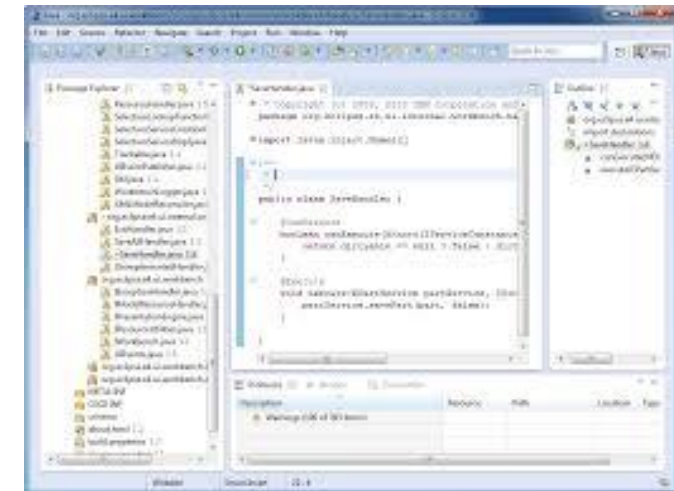
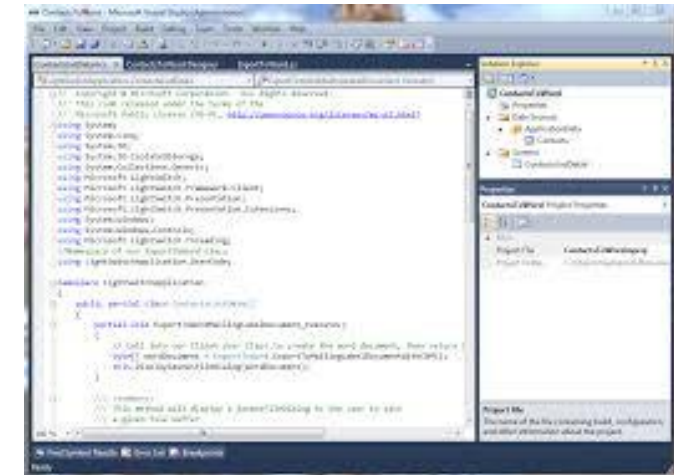
i.e. Mbed

- Browser-hosted GUI
  - Online IDE
  - Cloud-stored development  i.e. Mbed
  - Basic examples (aka 'Programs')
- 
- Command line UI
  - Manual project setup
  - Syntax-aware character-oriented code editor
  - Not too 'integrated' but still an IDE



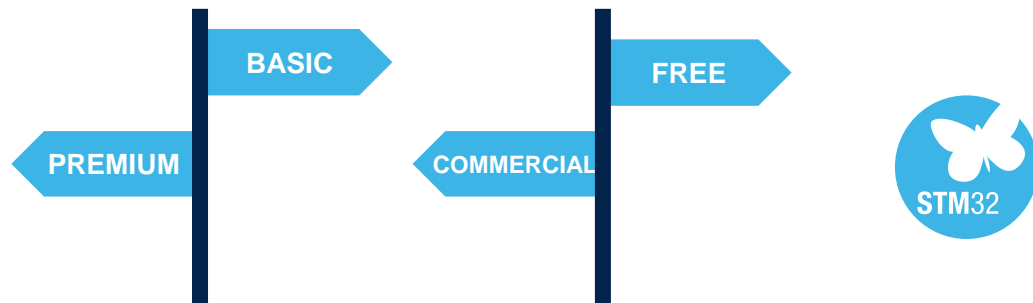
# General-purpose IDE families

- General-purpose IDEs are available in two major flavors with main differences at:
  - IDE look-and-feel
  - Project setup and configuration
  - Capabilities to embed tool extensions
- Microsoft Visual Studio like
  - Simpler UI, identical to classical PC Development
  - Concise and intuitive menus
  - C/C++ oriented, easy project configuration (i.e. debug/release and optimization level toggling)
  - Small footprint
- Eclipse based
  - Being Java-based, easy porting to different hosts
  - Seamless integration of custom plug-in modules and new features
  - Programming language flexible
  - Perspective based



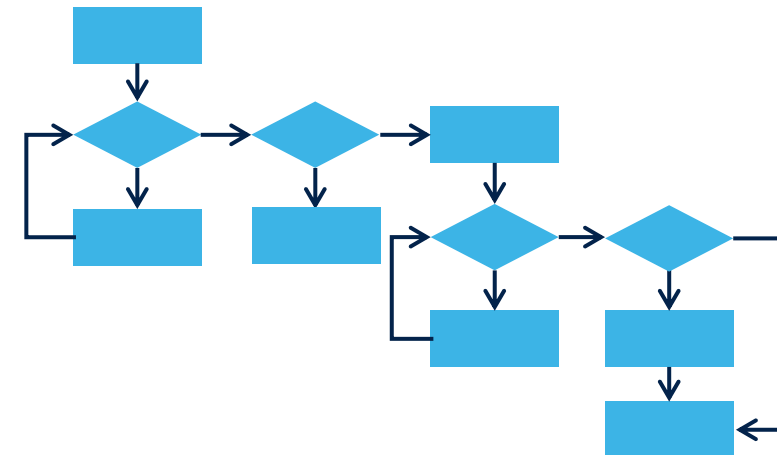
# IDE selection

- IDE feature set varies at tool edition
  - Basic IDEs allow minimal features
  - Premium IDEs allow much powerful editing, debug, trace, optimization tools and safety certified editions
  - Free-of-charge editions allow IDE early discovery
    - Feature demoted
    - Time limited
  - Special editions for a given Silicon Vendor or Device Series or Part Number are often on sale at special price
  - IDE license cost scales with the feature set



- Selection goes through simple questions
  - Need a special-purpose IDE?
  - Which programming language and toolchain?
  - Which IDE style do I like (Eclipse or Visual Studio)?
  - Which host system?
  - Do I need a Premium edition?
  - How much am I ready to pay?

The IDE 'used last time' most times wins



# MCU utility tools





# A large community of tool providers

Offering Free utility tools  
(Trace/Monitors, GUI builders, ...)

arm KEIL

DSP  
CONCEPTS

Microsoft

IAR  
SYSTEMS

iSYSTEM

Micrium  
Empowering Embedded Systems

MIKROE

percepio  
Stop guessing!

pls  
Development Tools

SEGGER

ST  
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Embedded  
Wizard

# A large community of tool providers

Offering Commercial utility tools  
(Trace/Monitors, GUI builders, ...)

arm KEIL

DSP  
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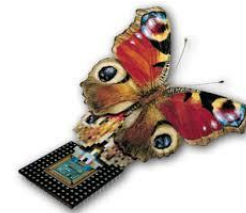
MIKROE

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Offering free and commercial utility tools  
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**arm** KEIL

**DSP** CONCEPTS

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 **iSYSTEM**

**Micrium**  
Empowering Embedded Systems

MIKROE

 **percepio**  
Stop guessing!

**pls**  
Development Tools

 **SEGGER**

  
life.augmented

 **Embedded Wizard**



# ST STM32 MCU code generators

Application specific Free ST Tools	Description	Applicability
<a href="#">ST-MC-SUITE</a>	Online tool to select the motor control solution that best fits your application	All STM32
<a href="#">X-CUBE-MCSDK</a>	Motor control software development kit	
<a href="#">STM32 MAT/TARGET</a>	MATLAB-based signal processing filter tool	
<a href="#">TouchGFXDesigner</a>	Free GUI builder utility previously known as Draupner TouchGFX	High Performance STM32 Series (F4/F7/H7)
<a href="#">STemWin GUI Builder</a>	Free GUI builder utility derived from Segger <a href="#">emWin GUI Builder</a>	
<a href="#">ST-AudioWeaver</a>	Free audio filter configuration tool, 160 basic filters available, derived from DSP Concepts <a href="#">AudioWeaver</a>	

STM32 application-specific configuration tools generate code integrating the related software library  
All ST software tools are free editions



# Partner STM32 code generators

GUI Builder	Product	Toolchain compatibility	Applicability	Free edition
Microsoft	<a href="#">GuiX</a>	Compatible with MikroElektronika C/Basic/Pascal compilers	High-performance STM32 series (F4/F7/H7)	
MikroElektronika	<a href="#">VisualTFT</a>			Component limit: 7
Segger	<a href="#">emWin GUI Builder</a>			<a href="#">STemWin GUI Builder</a>
TARA Systems	<a href="#">Embedded Wizard</a>			<a href="#">ST evaluation edition</a>

Audio tools	Product	Attributes, compatibility	Applicability	Free edition
DSP Concepts	<a href="#">AudioWeaver</a>	Commercial Golden version of ST-AudioWeaver, MATLAB-ready	STM32F4/F7/H7	<a href="#">ST-AudioWeaver</a>

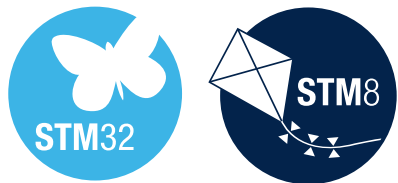
State Machine tools	Product	Attributes, compatibility	Applicability	Free edition
IAR Systems	<a href="#">IAR Visual State</a>	State Machine code generator. Fully integrated with IAR-EWARM	All STM32	Time limit: 30-day

STM32 application-specific configuration tools generate code integrating the related software library  
Free edition highlights the most attractive option. Full details available at IDE provider website








# Partner STM32 code analyzers

Code Analyzer	Product	Toolchain compatibility	Applicability	Free edition
Arm KEIL	<u>MDK plugins</u>	C/C++ code static analyzer, covering MISRA C:2012 and MISRA C++:2008. Provided by Gimpel Software and Parasoft Fully integrated with MDK5	All STM32	No
IAR Systems	<u>IAR C-STAT</u>	C/C++ code static analyzer, covering MISRA C:2012 and MISRA C++:2008. CWE and CERT C/C++ aware. Fully integrated with IAR-EWARM	All STM32	No

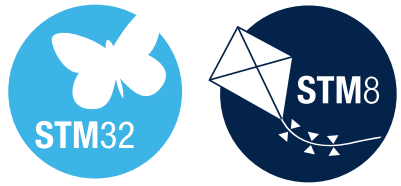


# Hardware debug probes

ST Debug Probes		On-board	STM32	STM8	Description
	<u>ST-Link v2</u>		✓	✓	Stand-alone hardware debug probe available as commercial product
	<u>ST-Link v2-1</u>	✓	✓	✓	On-board hardware debug probe, described with the relevant board
	<u>ST-Link v3E</u>	✓	✓		Latest generation on-board hardware debug probe, described with the relevant board
	<u>ST-Link v3S</u>		✓		Latest generation stand-alone hardware debug probe available as commercial product

Commercial Debug Probes		STM32	STM8	Description
Provider	Product			
	<u>I-jet</u>	✓		
	<u>I-jet Trace</u>	✓		ETM, 256MB memory buffer
	<u>ULINK2</u>	✓		ETM, Streaming trace
	<u>ULINKpro</u>	✓		ETM, Streaming trace
	<u>ULINKplus</u>	✓		ETM, Streaming trace
	<u>J-link</u>	✓		Streaming trace
	<u>J-link Trace</u>	✓		ETM, 16MB memory buffer
	<u>ic5000</u>	✓	✓	ETM, 256MB memory buffer
	<u>ic5700</u>	✓		ETM, 1GB memory buffer

Free software upgrade for ST-Link v2 hardware probes to support the J-Link protocol



# ST program/monitor tools

Free ST Programming Tools	STM32	STM8	Description
<a href="#">STM32CubeProg</a>	✓		STM32 microcontroller Programmer tool
<a href="#">STLink-Utility</a>	✓		Programmer based on ST-Link probe, including support for external memories
<a href="#">STVP (STM32)</a> / <a href="#">STVP (STM8)</a>	✓	✓	Programmer based on ST-Link probe
<a href="#">FLASHER-STM32</a> / <a href="#">FLASHER-STM8</a>	✓	✓	Flash loader through UART
<a href="#">DfuSe</a>	✓		Device firmware upgrader through USB, including support for external memories

Free ST Monitoring Tools	STM32	STM8	Description
<a href="#">STM32CubeMonitor</a>	✓		STM32 microcontroller runtime variable monitoring and visualization tool
<a href="#">STM32CubeMonPwr</a>	✓		STM32 microcontroller Power Monitor tool
<a href="#">STM32CubeMonRF</a>	✓		STM32 microcontroller Radio Performance Monitor tool
<a href="#">STM32CubeMonUCPD</a>	✓		STM32 microcontroller USB Type-C Power Delivery Monitor tool
<a href="#">STMStudio (STM32)</a> / <a href="#">STMStudio (STM8)</a>	✓	✓	Data Monitor tool relying on the ST-Link channel

All ST provided Software tools are Free editions





# STM32 partner monitor/trace tools

Monitor/Trace	Product	Channel	OS awareness and IDE compatibility	Free edition
Microsoft	<a href="#">TraceX</a>	J-Link	ThreadX OS aware, Multi-core supported	Time limit: 30-day
Micrium	<a href="#">uc/Probe</a>	J-Link	uc-OS aware, CMSIS-DAP ready, IAR plug-in available	Time limit: 30-day
Percepio	<a href="#">Tracealyzer</a>	ST-Link J-Link	FreeRTOS/uc-OS/embOS/Linux/VxWorks/Linux aware, IAR plug-in, STM32CubeIDE dedicated Eclipse plug-in and generic Eclipse plug-in	
Segger	<a href="#">J-Scope</a>	J-Link	Data visualization	FREE
	<a href="#">SystemView</a>	J-Link	FreeRTOS/embOS aware	FREE

Debug Engines	Product	OS awareness	Free edition
PLS (Universal Debug Engine)	<a href="#">UDE</a>	Nucleus/uc-OS/Keil RTX-OS aware	

Full details about free edition available at IDE provider website



# Releasing your creativity



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# Thank you

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