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# Software development tools STM32 and STM8 microcontrollers



# Content

## Software Development Tools - Overview

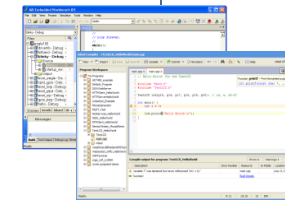


## MCU/MPU Selection and Configuration



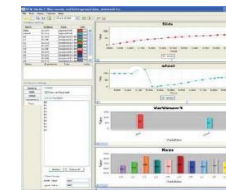
## Integrated Development Environments

For **STM32**



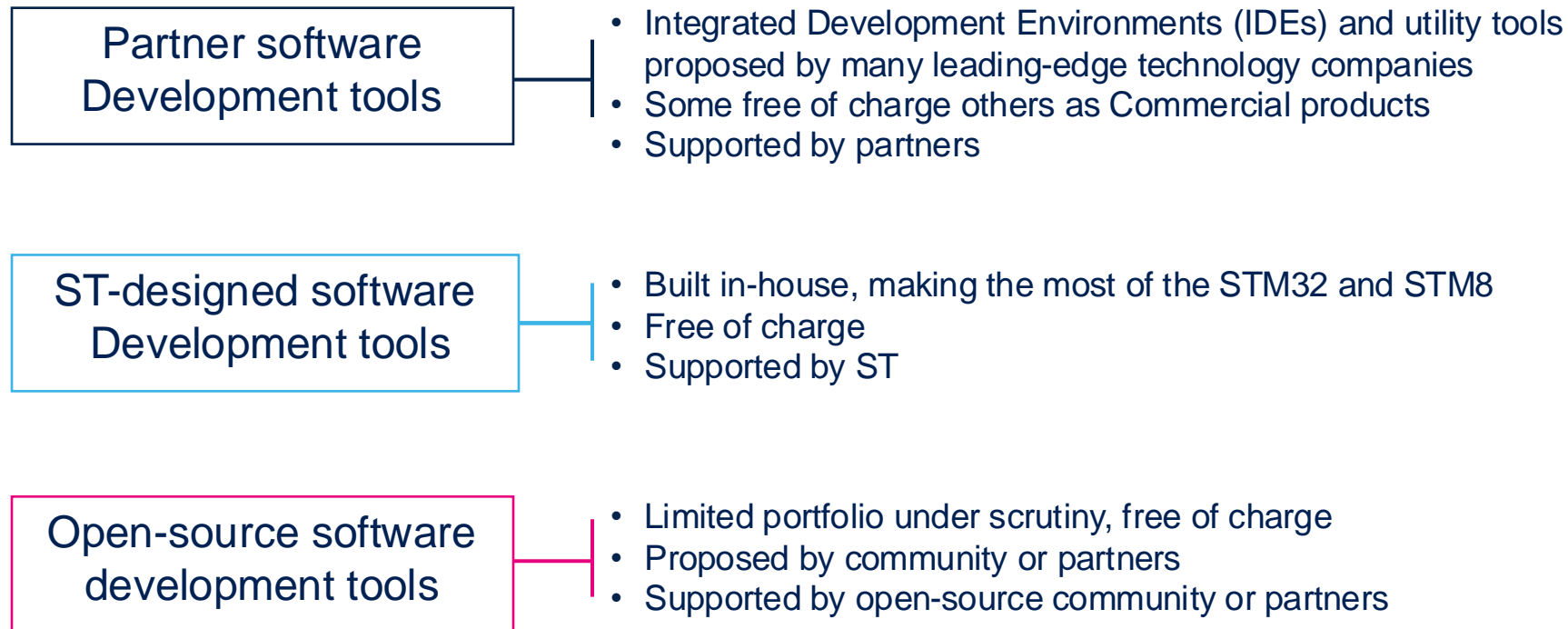
For **STM8**

## MCU Utility Tools



# A rich portfolio

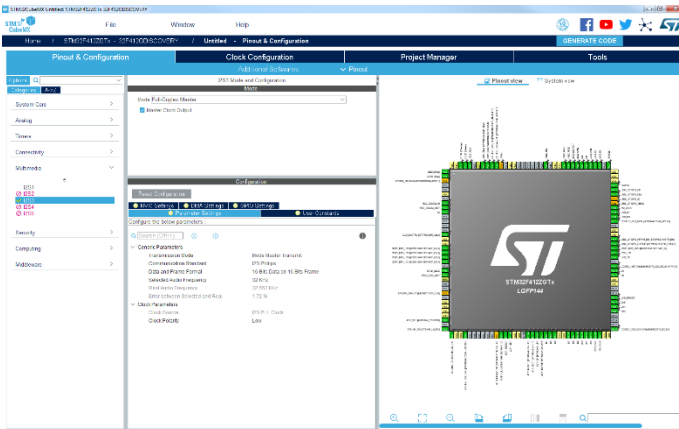
- Extensive ecosystem of software development tools around the STM32 and STM8
- Find the right solution for your requirements in terms of price, feature, license scheme and support



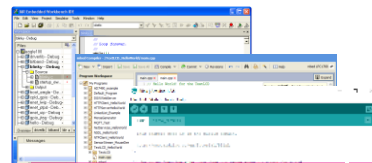


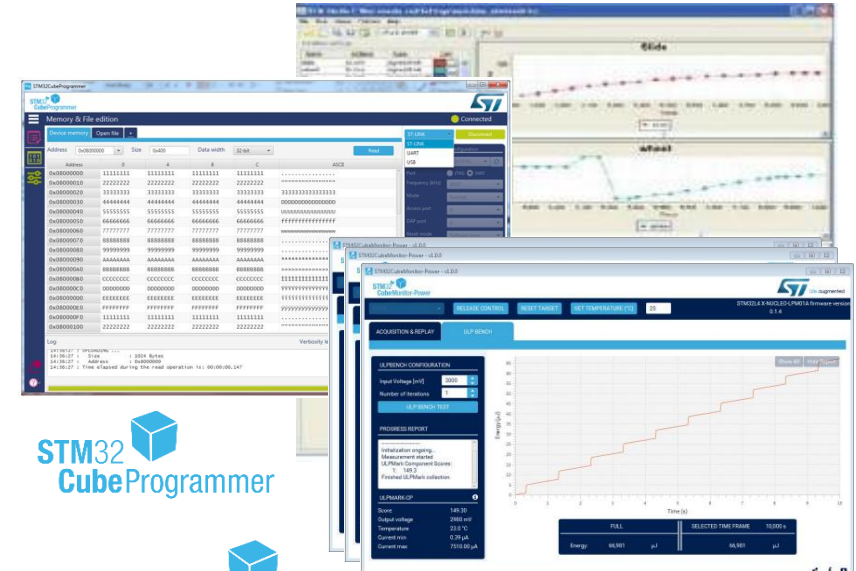
# STM32 MCU overview

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



FREE IDEs



**STM32CubeMX, GUI/AI builders** Configure & generate code

**ST and Partner IDEs** Compile and Debug

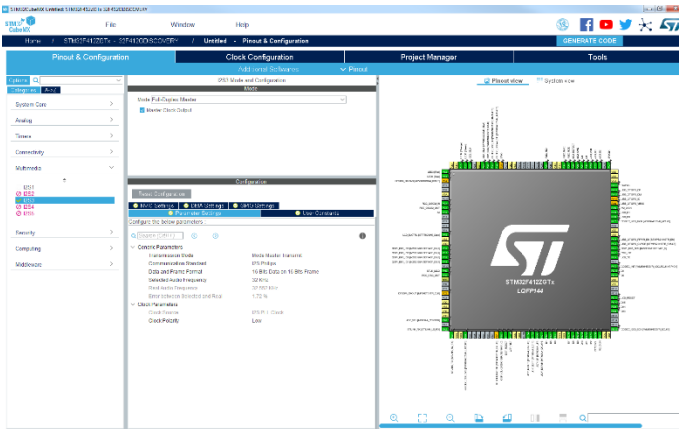
**STM32CubeProgrammer/Monitor** Monitor, Program & Utilities



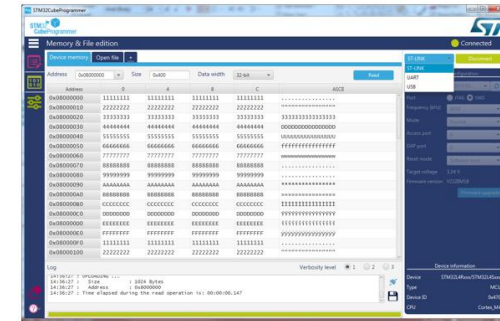
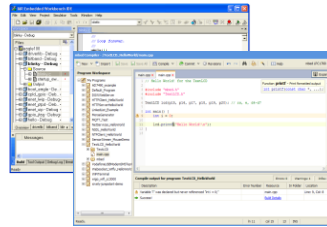


# STM32 MPU overview

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



FREE tools



**STM32CubeMX**  
Configure & Generate Code

**ST and Partner tools**  
Compile and Debug

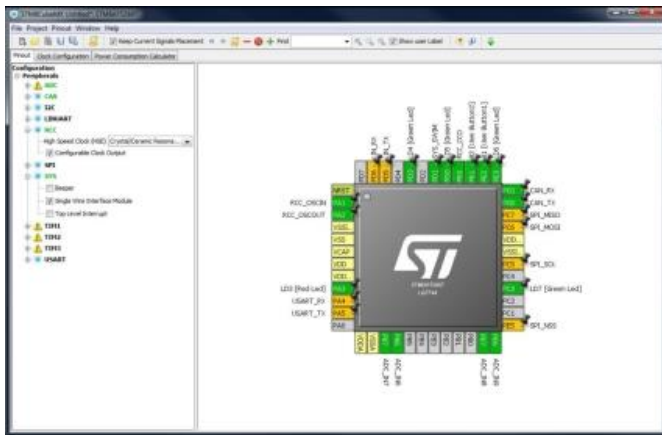
**STM32CubeProgrammer**  
Program



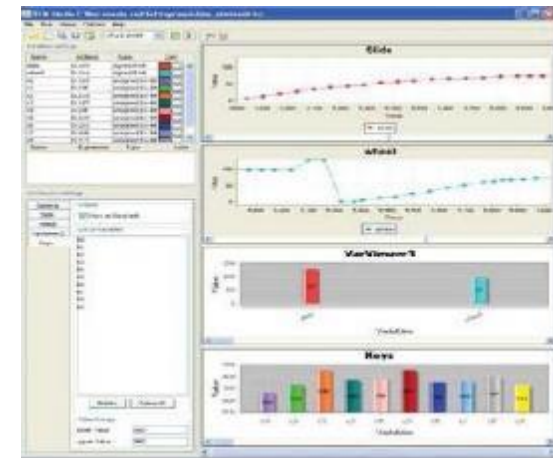
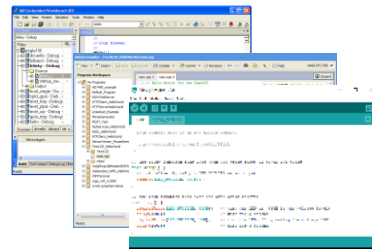


# STM8 overview

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



FREE IDEs



**STM8CubeMX**  
Configure

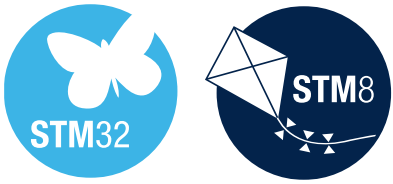
**ST and Partner IDEs**  
Compile and Debug

**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-PC</a>	✓	✓	✓	PC utility to select the MCU or MPU and the board that best fits your application.
<a href="#">STM32 Finder</a>	✓	✓		Smartphone and tablet utility to select the STM32 and board that best fits your application.
<a href="#">STM8 Finder</a>			✓	Smartphone and tablet utility to select the STM8 MCU and board that best fits your application.
<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

MCU application-specific code generators for graphics, audio and motor control are listed among the [MCU Utility tools](#).  
 All ST tools are Free editions.



# STM32 MCU IDE portfolio





# A large community of IDE providers

Offering general-purpose, free IDEs





# A large community of IDE providers

Offering special-purpose, free IDEs





# 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







# STM32 free IDEs

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

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
IAR Systems	<a href="#">EWARM</a> 	All	Proprietary	IAR	IAR	✓			✓	Code limit: 32KB
Arm® Keil®	<a href="#">MDK5-Cortex-M</a> 	All	Proprietary	llvm / Arm	uVision	✓			✓	Code limit: 32KB
	<a href="#">Keil Studio</a>	All	Theia	llvm	uVision	✓	✓	✓		Online
Emprog	<a href="#">ThunderBench</a>	All	Eclipse	gcc	OpenOCD	✓				Time limit: 30-day
iSystem	<a href="#">iSYS-WinIDEA</a>	All	Proprietary	gcc, others	gdb	✓				<a href="#">WinIDEAOpen</a>
Rowley	<a href="#">CrossWorks</a>	All	Proprietary	gcc	Rowley	✓	✓	✓		Time limit: 30-day
Segger	<a href="#">Embedded Studio</a>	All	Proprietary	gcc / llvm	Segger	✓	✓	✓		Build/Run warning
SysProgs	<a href="#">VisualGDB Embedded</a>	All	Proprietary	gcc / llvm	OpenOCD	✓	✓			Time limit: 30-day
Tasking	<a href="#">TaskingVX</a>	All	Eclipse	Tasking	Tasking	✓	✓	✓		On request
Cosmic	<a href="#">IDEA</a>	All	Proprietary	Cosmic	Cosmic	✓				Code limit: 32KB
Green hills	<a href="#">MultiIDE</a>	All	Proprietary	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	U5	WB	
STM32CubeIDE	All																<a href="#">Link</a>
System Workbench (SW4STM32)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	
Arduino IDE	✓	✓		✓	✓	✓						✓	✓			✓	
Arm® Keil® Studio	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	
Atollic TrueSTUDIO	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓				
ThunderBench	✓	✓	✓	✓	✓	✓						✓	✓				
EWARM	All																<a href="#">Link</a>
iSYS-WinIDEA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
MDK5-Cortex-M	All																<a href="#">Link</a>
Rowley Associates CrossWorks	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓				
Embedded Studio	✓	✓	✓		✓	✓	✓		✓		✓	✓	✓	✓		✓	
VisualGDB Embedded		✓	✓	✓	✓	✓					✓	✓	✓				
TaskingVX	✓	✓	✓	✓	✓	✓						✓					

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 Keil Studio	Several Videos							
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>
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="#">System Workbench for Linux (SW4Linux)</a>	Cortex-A	Eclipse plug-in	No	✓	✓	✓
Arm	<a href="#">ARM Development Studio</a>	All	Heterogeneous core IDE	Time limit: 30-day	✓	✓	
Arm Keil	<a href="#">MDK5-Cortex-M</a> 	Cortex-M	Cortex-M limited IDE	Code limit: 32KB	✓		
	<a href="#">Keil Studio</a>	All	Theia based IDE	Online	✓	✓	✓
Crank Software Inc.	<a href="#">Storyboard Designer</a>	Cortex-A	Graphical User Interface designer	Trial version	✓	✓	✓
IAR Systems	<a href="#">EWARM</a> 	Cortex-M	Cortex-M limited IDE	Code limit: 32KB	✓		
Qt	<a href="#">Qt Development Tools</a>	Cortex-A	Graphical User Interface designer and IDE	Trial version			
STMicroelectronics	<a href="#">STM32CubeMX</a>	All	Hardware and software configurator, project and code generator	Yes	✓	✓	✓
	<a href="#">STM32CubeIDE</a>	All	Eclipse based IDE	Yes	✓	✓	✓
	<a href="#">STM32CubeProg</a>	All	Flash Programmer	Yes	✓	✓	✓
Timesys	<a href="#">TimeStorm IDE</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
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
Arduino	<a href="#">Arduino IDE</a>	✓		Cosmic		✓				FREE, unlimited

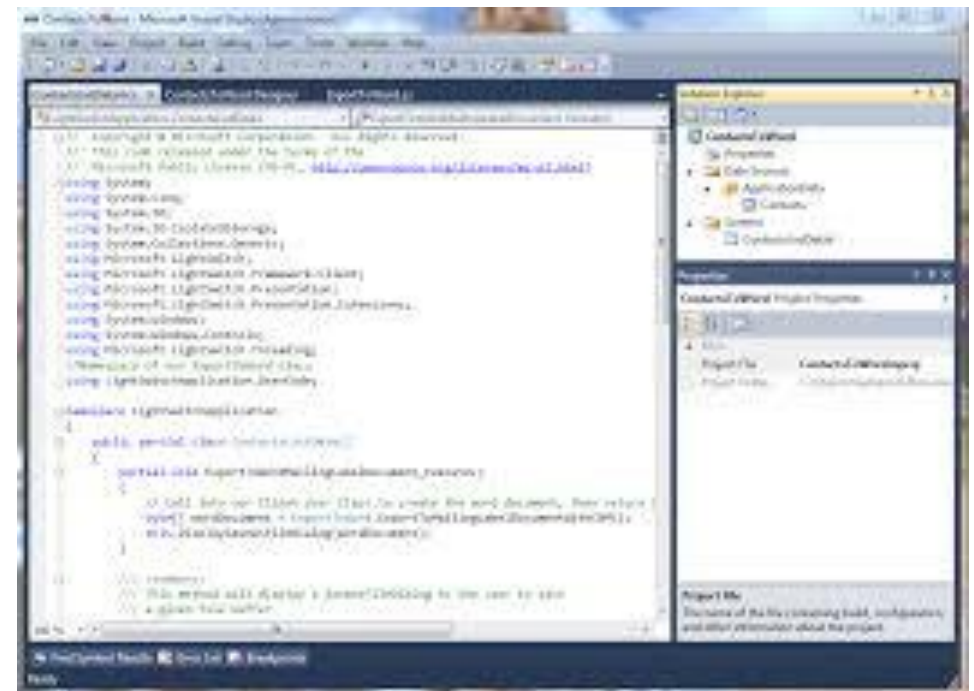
Free edition highlights all options. Several commercial editions may exist.  
Full details available at IDE provider website.

# 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



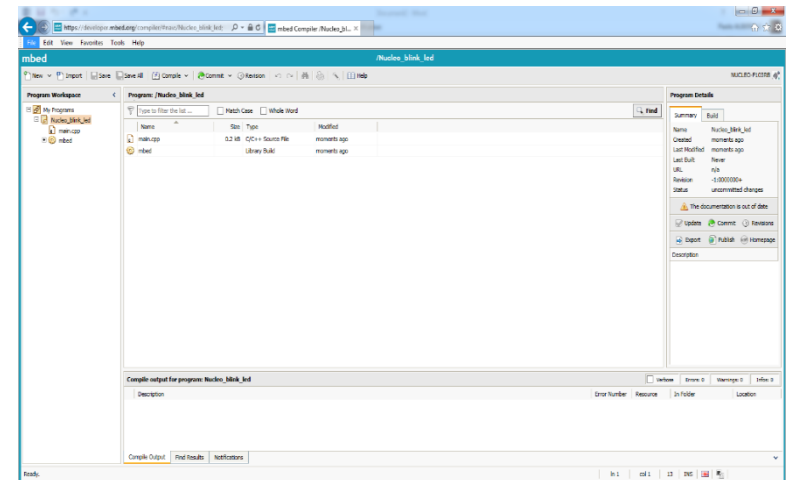
# Special-purpose IDEs

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

i.e. Arduino

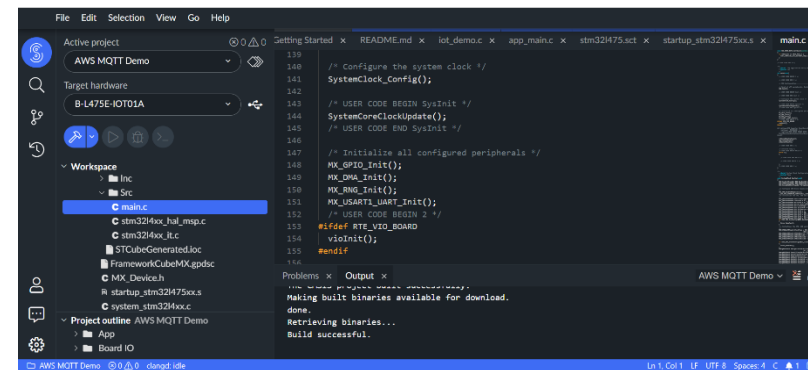
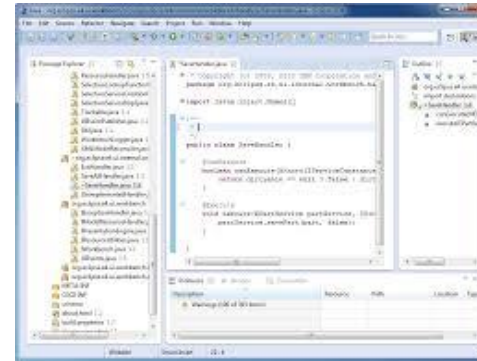
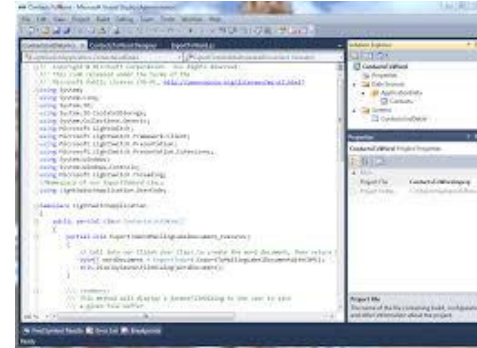
i.e. Mbed

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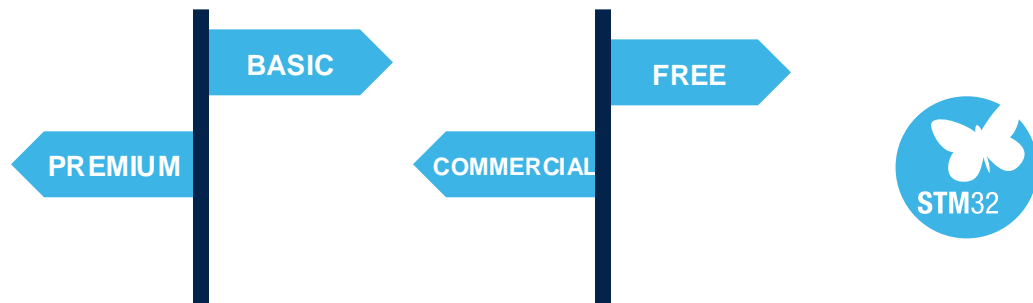
# General-purpose IDE families

- General-purpose IDEs are available in several 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, small footprint
  - Concise and intuitive menus
  - C/C++ oriented, easy project configuration (i.e. debug/release and optimization level toggling)
- 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
- Theia based
  - Built on Web technology for browser launch on any host
  - Online and Offline versions
  - Custom plug-in modules, including proprietary tools and toolchains



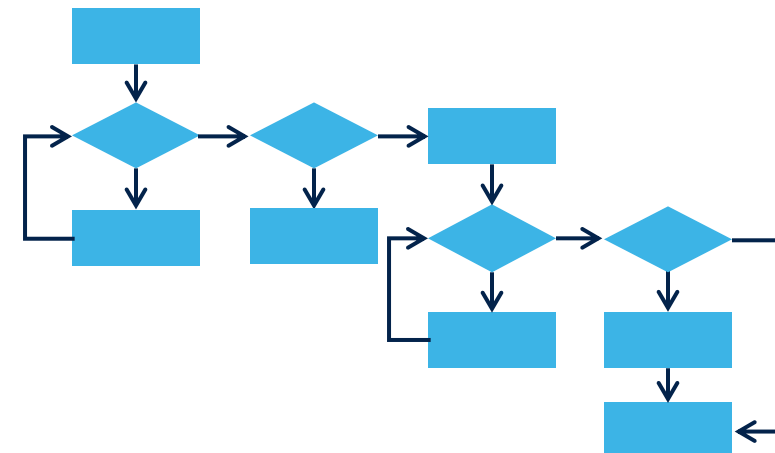
# IDE selection

- 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 platform do I like (Eclipse, Visual Studio, Theia)?
  - 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

MIKROE

percepio  
Stop guessing!

pls  
Development Tools

SEGGER

ST  
life.augmented

Embedded  
Wizard

# A large community of tool providers

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

arm KEIL

DSP  
CONCEPTS

Microsoft

IAR  
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SEGGER

ST  
life.augmented

Embedded  
Wizard



# ST MCU code generators

Application specific Free ST Tools	Description	Applicability
<a href="#">X-CUBE-AI</a>	Artificial Intelligence software development kit	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>		High-performance STM32 series (F4/F7/H7)	
MikroElektronika	<a href="#">VisualTFT</a>	Compatible with MikroElektronika C/Basic/Pascal compilers		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>

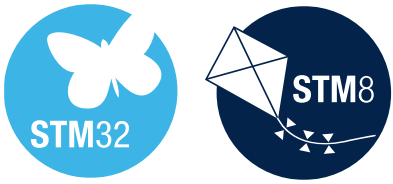
State Machine tools	Product	Attributes, compatibility	Applicability	Free edition
IAR Systems	<a href="#">IAR Visual State</a>	State Machine code generator. Fully integrated with IAR-EWARM	All STM32	Time limit: 30-day

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

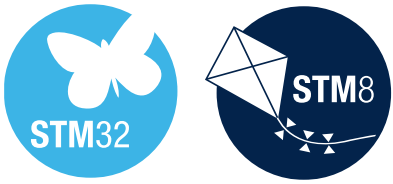


# Hardware debug probes

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

Commercial Debug Probes		STM32	STM8	Description
Provider	Product			
IAR		<a href="#">I-jet</a>	✓	
		<a href="#">I-jet Trace</a>	✓	ETM, 256MB memory buffer
Arm KEIL		<a href="#">ULINK2</a>	✓	ETM, Streaming trace
		<a href="#">ULINKpro</a>	✓	ETM, Streaming trace
		<a href="#">ULINKplus</a>	✓	ETM, Streaming trace
Segger		<a href="#">J-link</a>	✓	Streaming trace
		<a href="#">J-link Trace</a>	✓	ETM, 16MB memory buffer
iSystem		<a href="#">ic5000</a>	✓	✓ ETM, 256MB memory buffer
		<a href="#">ic5700</a>	✓	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 href="#">STVP (STM8)</a></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 href="#">STMStudio (STM8)</a></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	<u>TraceX</u>	J-Link	ThreadX OS aware, Multi-core supported	Time limit: 30-day
Percepio	<u>Tracealyzer</u>	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	<u>J-Scope</u>	J-Link	Data visualization	FREE
	<u>SystemView</u>	J-Link	FreeRTOS/embOS aware	FREE

Debug Engines	Product	OS awareness	Free edition
PLS (Universal Debug Engine)	<u>UDE</u>	Nucleus/uc-OS/Keil RTX-OS aware	

Full details about free edition available at IDE provider website

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