Software development tools
STM32 and STM8 microcontrollers

Content

MCU/MPU Selection and Configuration

Software Development Tools - Overview
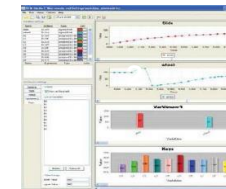
Integrated Development Environments
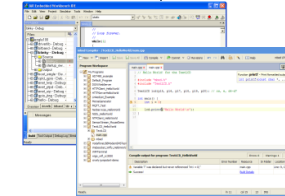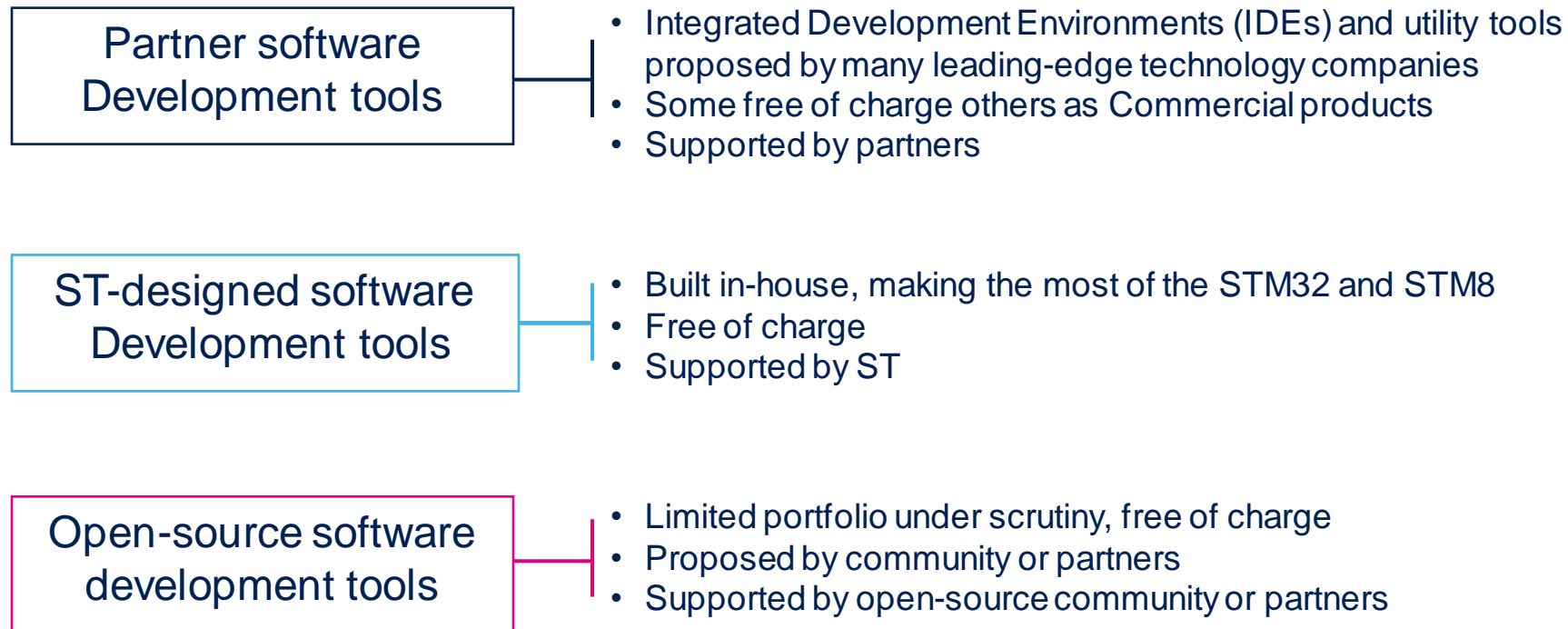
For **STM**32   For **STM**8

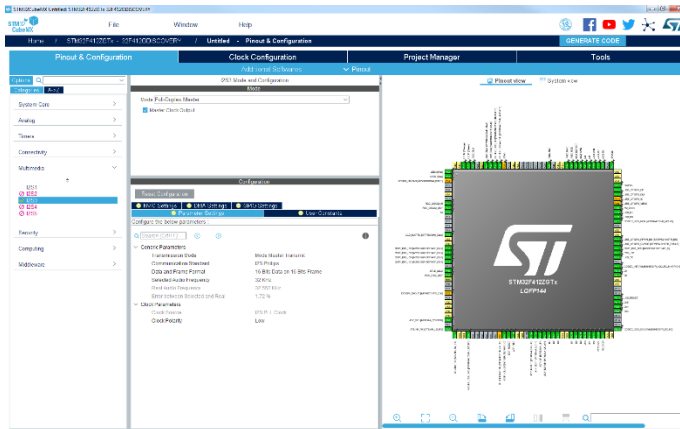MCU Utility Tools

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
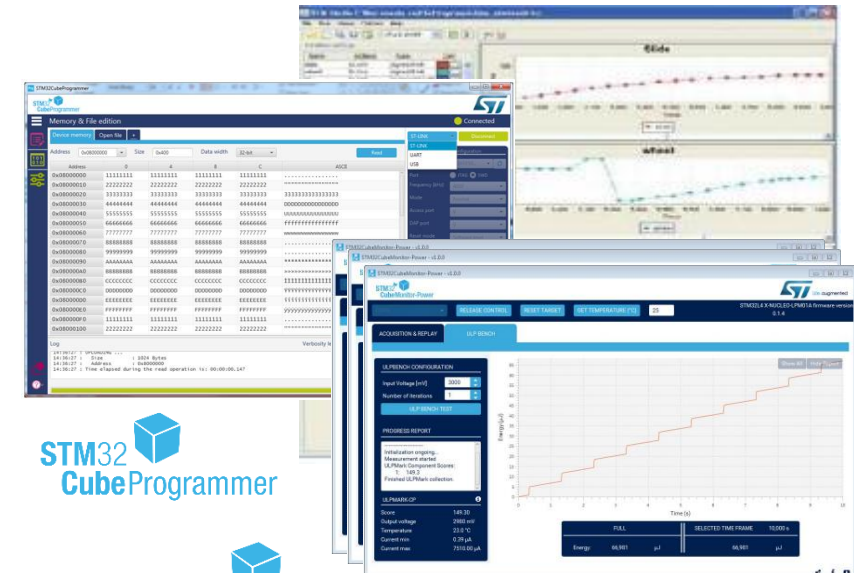
Partner software Development tools

- Integrated Development Environments (IDEs) and utility tools proposed by many leading-edge technology companies
- Some free of charge others as Commercial products
- Supported by partners

ST-designed software Development tools

- Built in-house, making the most of the STM32 and STM8
- Free of charge
- Supported by ST

Open-source software development tools

- Limited portfolio under scrutiny, free of charge
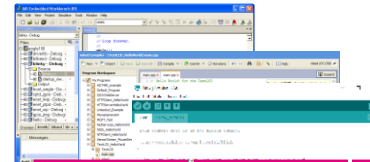- Proposed by community or partners
- Supported by open-source community or partners

A C/C++ flow in three steps

STM32CubeMX, GUI/AI builders
Configure & generate code

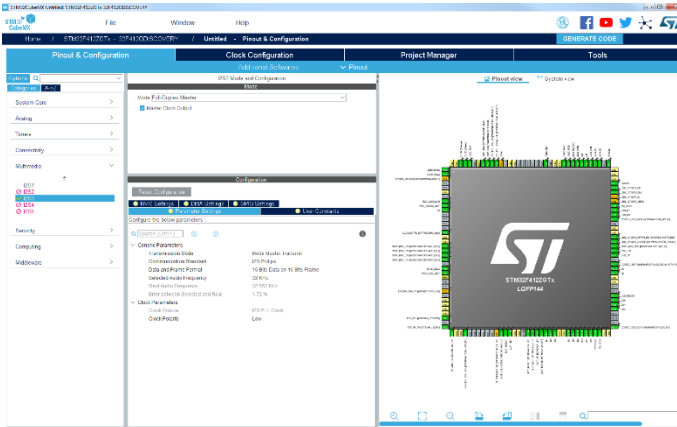**ST and Partner IDEs**
Compile and Debug

STM32CubeProgrammer/Monitor
Monitor, Program & Utilities

A C/C++ flow in three steps

FREE tools

STM32 CubeMX

STM32 CubeIDE

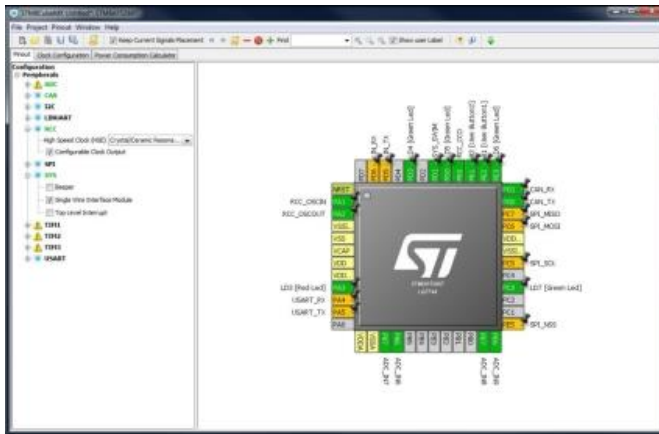STM32 CubeProgrammer
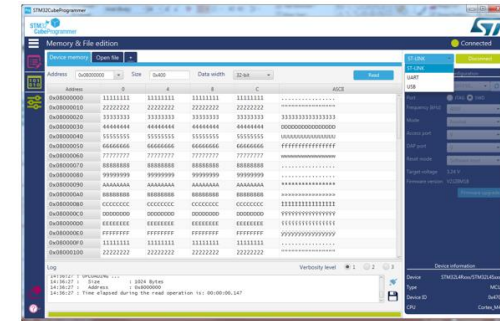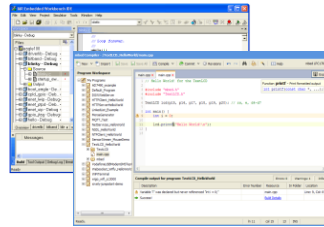
STM32CubeMX
Configure & Generate Code

ST and Partner tools
Compile and Debug
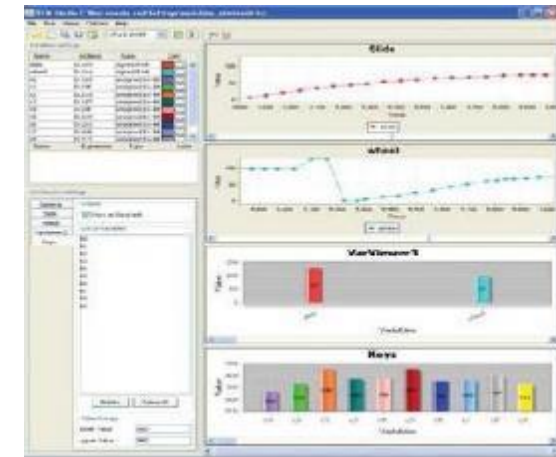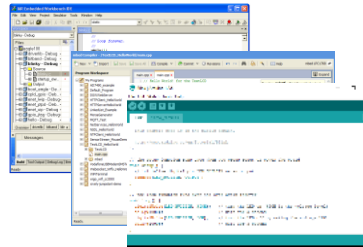
STM32CubeProgrammer
Program

A C/C++ flow in three steps
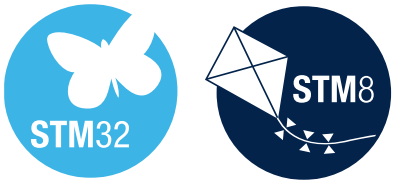

FREE IDEs

STM8CubeMX
Configure

ST and Partner IDEs
Compile and Debug

STVP, STLink-Util., STMStudio
Monitor & Program

MCU/MPU selection and configuration

Free ST Tool	STM32		STM8	Description
	MCU	MPU		
ST-MCU-FINDER-PC	✓	✓	✓	PC utility to select the MCU or MPU and the board that best fits your application.
STM32 Finder	✓	✓		Smartphone and tablet utility to select the STM32 and board that best fits your application.
STM8 Finder			✓	Smartphone and tablet utility to select the STM8 MCU and board that best fits your application.
STM8CubeMX			✓	STM8 Micro eXplorer, hardware and software configurator, project configuration reporter, and power consumption calculator
STM32CubeMX	✓	✓		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
STM32 Clock configurators	✓			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

Offering general-purpose, free IDEs

Offering special-purpose, free IDEs

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	STM32CubeIDE	All	Eclipse	✓		gcc	gdb / OpenOCD	✓	✓	✓
ac6	System Workbench (SW4STM32)	All	Eclipse	✓		gcc	OpenOCD	✓	✓	✓
Atollic	Atollic TrueSTUDIO	All	Eclipse	✓		gcc	gdb	✓	✓	
iSystem	iSYS-WinIDEAOpen	All	Proprietary	✓		gcc	gdb	✓		
Arm KEIL	MDK5-Cortex-M MadeForSTM32 V2	M0, M0+	Proprietary	✓		llvm/ARM	uVision	✓		
Arduino	Arduino IDE	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	EWARM MadeForSTM32 V2	All	Proprietary	IAR	IAR	✓			✓	Code limit: 32KB
Arm® Keil®	MDK5-Cortex-M MadeForSTM32 V2	All	Proprietary	llvm / Arm	uVision	✓			✓	Code limit: 32KB
	Keil Studio	All	Theia	llvm	uVision	✓	✓	✓		Online
Emprog	ThunderBench	All	Eclipse	gcc	OpenOCD	✓				Time limit: 30-day
iSystem	iSYS-WinIDEA	All	Proprietary	gcc, others	gdb	✓				WinIDEAOpen
Rowley	CrossWorks	All	Proprietary	gcc	Rowley	✓	✓	✓		Time limit: 30-day
Segger	Embedded Studio	All	Proprietary	gcc / llvm	Segger	✓	✓	✓		Build/Run warning
SysProgs	VisualGDB Embedded	All	Proprietary	gcc / llvm	OpenOCD	✓	✓			Time limit: 30-day
Tasking	TaskingVX	All	Eclipse	Tasking	Tasking	✓	✓	✓		On request
Cosmic	IDEA	All	Proprietary	Cosmic	Cosmic	✓				Code limit: 32KB
Green hills	MultiIDE	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

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																Link
System Workbench (SW4STM32)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	
Arduino IDE	✓	✓		✓	✓	✓						✓	✓			✓	Forum Link
Arm® Keil® Studio	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	Link
Atollic TrueSTUDIO	✓	✓	✓	✓	✓	✓			✓		✓	✓	✓				Link
ThunderBench	✓	✓	✓	✓	✓	✓						✓	✓				Link
EWARM	All																Link
iSYS-WinIDEA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				MCUs / Examples
MDK5-Cortex-M	All																Link
Rowley Associates CrossWorks	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓				MCUs / Boards
Embedded Studio	✓	✓	✓		✓	✓	✓		✓		✓	✓	✓	✓		✓	Link
VisualGDB Embedded		✓	✓	✓	✓	✓					✓	✓	✓				
TaskingVX	✓	✓	✓	✓	✓	✓						✓					Link

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	Link	Link	YouTube Link		Link			
System Workbench (SW4STM32)	Scattered Videos	Link				Link	Link	
Arduino IDE	Several Videos	Link	YouTube Link					
Arm Keil Studio	Several Videos							
Atollic TrueSTUDIO	Link							
ThunderBench	Link							Link
EWARM	Scattered Videos		Link	Scattered	Link	Link		Link
iSYS-WinIDEA						iSLink		Link
MDK5-Cortex-M	Scattered Videos	Link		Scattered	Link	Link		Link
Rowley Associates CrossWorks	Link	Login Link	RSS feed			Link		Link
Embedded Studio	Link	Link					Link	Link
VisualGDB Embedded	Scattered Videos	Link			Link	Link		
TaskingVX	Scattered Videos			Link		Link		Link

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

STM32 MPU tool portfolio

A wide offer of software development tools

STM32 MPU tools

Provider	Product and labels	Cores	Description	Free edition	Win	Linux	OS X
ac6	System Workbench for Linux (SW4Linux)	Cortex-A	Eclipse plug-in	No	✓	✓	✓
Arm	ARM Development Studio	All	Heterogeneous core IDE	Time limit: 30-day	✓	✓	
Arm Keil	MDK5-Cortex-M MadeForSTM32 V2	Cortex-M	Cortex-M limited IDE	Code limit: 32KB	✓		
	Keil Studio	All	Theia based IDE	Online	✓	✓	✓
Crank Software Inc.	Storyboard Designer	Cortex-A	Graphical User Interface designer	Trial version	✓	✓	✓
IAR Systems	EWARM MadeForSTM32 V2	Cortex-M	Cortex-M limited IDE	Code limit: 32KB	✓		
Qt	Qt Development Tools	Cortex-A	Graphical User Interface designer and IDE	Trial version			
STMicroelectronics	STM32CubeMX	All	Hardware and software configurator, project and code generator	Yes	✓	✓	✓
	STM32CubeIDE	All	Eclipse based IDE	Yes	✓	✓	✓
	STM32CubeProg	All	Flash Programmer	Yes	✓	✓	✓
Timesys	TimeStorm IDE	Cortex-A	Cortex-A limited IDE	Time limit: 30-day	✓	✓	

STM8 IDE portfolio

Offering general-purpose, free IDEs

Offering special-purpose, free IDEs

Offering general-purpose, commercial IDEs

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	IDEA	✓		Cosmic	Cosmic	✓				FREE, unlimited
STMicroelectronics	STVD	✓		Cosmic	STMicroelectronics	✓				FREE, unlimited
IAR Systems	EWSTM8	✓		IAR	IAR	✓			✓	Time limit: 30-day Code limit: 8 Kbytes
iSystem	iSYS-WinIDEA	✓		Cosmic	iSystem	✓				Time limit: 30-day
Arduino	Arduino IDE	✓		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
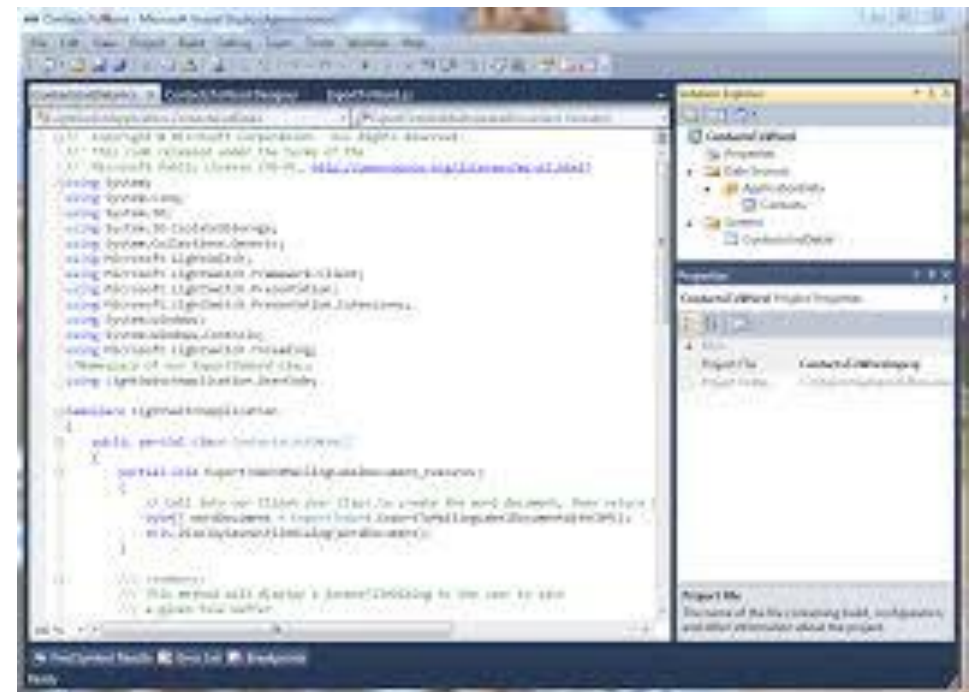
Special-purpose IDEs

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

  - Browser-hosted GUI
  - Online IDE
  - Cloud-stored development
  - Basic examples (aka 'Programs')

 i.e. Mbed
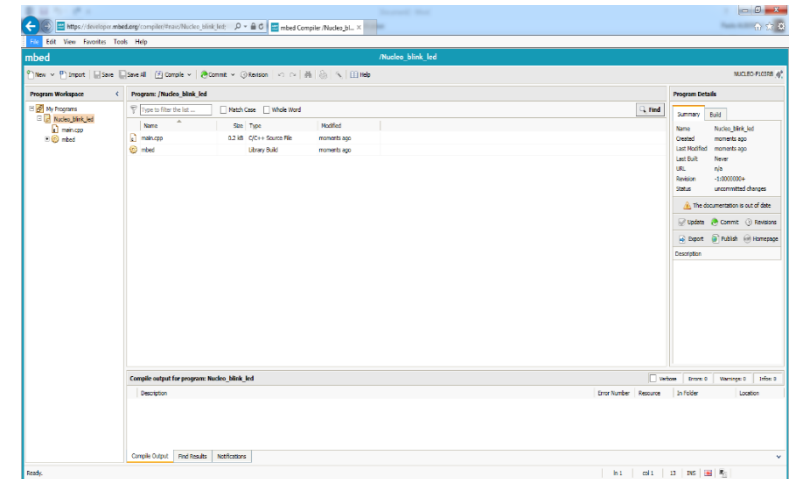
  - Command line UI
  - Manual project setup
  - Syntax-aware character-oriented code editor
 - Not too 'integrated' but still an IDE

General-purpose IDE families

- General-purpose IDEs are available in 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
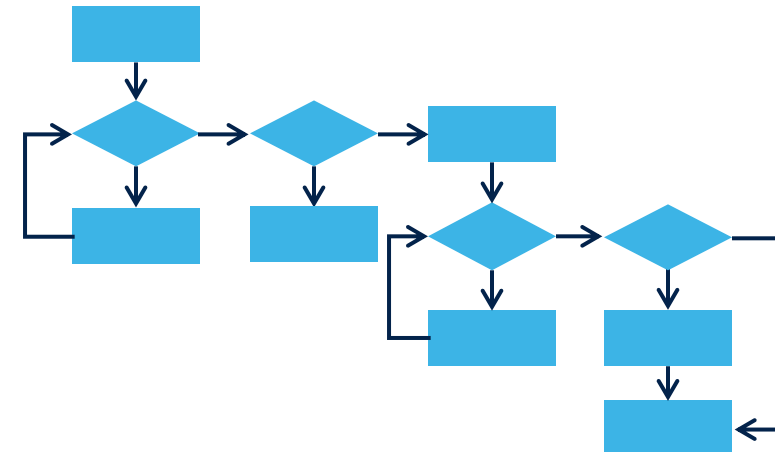 - Custom plug-in modules, including proprietary tools and toolchains
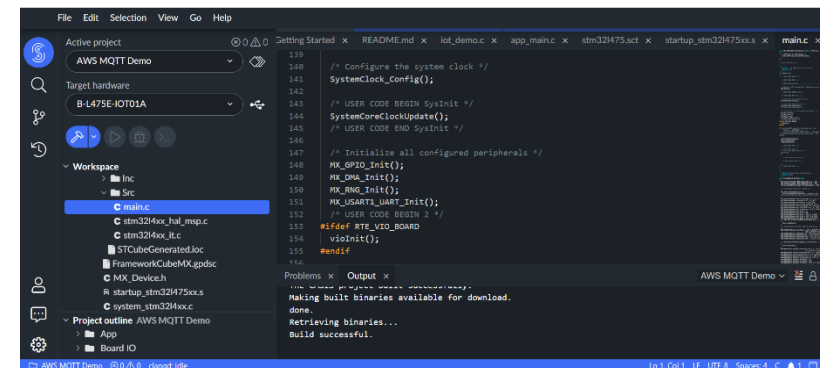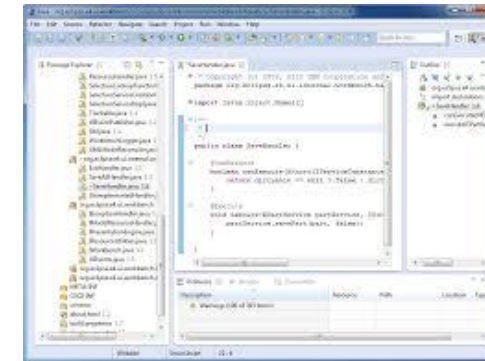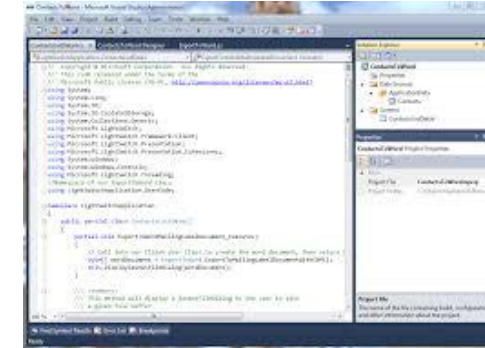
- IDE feature set varies at tool edition
  - Basic IDEs allow minimal features
  - Premium IDEs allow much powerful editing, debug, trace, optimization tools and safety certified editions
  - Free-of-charge editions allow IDE early discovery
    - Feature demoted
    - Time limited
  - Special editions 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
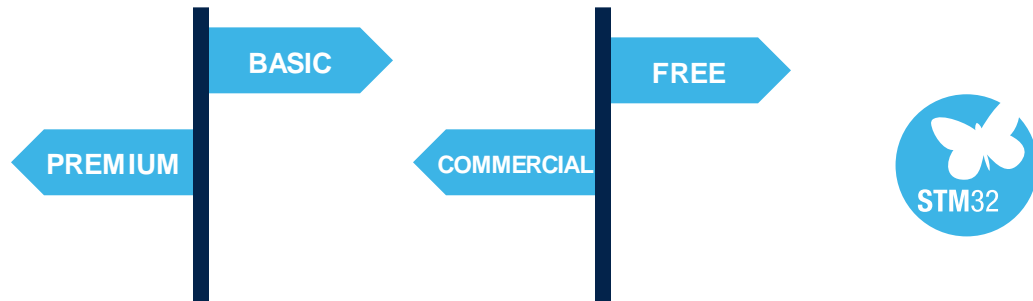
- Selection goes through simple questions
  - Need a special-purpose IDE?
  - Which programming language and toolchain?
  - Which IDE platform do I like (Eclipse, Visual Studio, Theia)?
  - Which host system?
  - Do I need a Premium edition?
  - How much am I ready to pay?

  The IDE 'used last time' most times wins

BASIC

PREMIUM

FREE

COMMERCIAL

STM32

MCU utility tools

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

**Offering Commercial utility tools
(Trace/Monitors, GUI builders, …)**
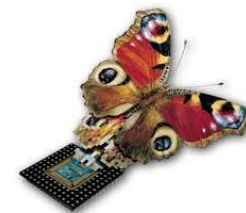
A large community of tool providers

**Offering free and commercial utility tools
(Trace/Monitors, GUI builders, …)**

ST MCU code generators

Application specific Free ST Tools	Description	Applicability
ST-MC-SUITE	Online tool to select the motor control solution that best fits your application	STM32/STM8
X-CUBE-AI	Artificial Intelligence software development kit	All STM32
X-CUBE-MCSDK	Motor control software development kit	
STM32_MAT/TARGET	MATLAB-based signal processing filter tool	
TouchGFXDesigner	Free GUI builder utility previously known as Draupner TouchGFX	High Performance STM32 Series (F4/F7/H7)
STemWin_GUI_Builder	Free GUI builder utility derived from Segger emWin_GUI_Builder	
ST-AudioWeaver	Free audio filter configuration tool, 160 basic filters available, derived from DSP Concepts AudioWeaver	

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	GuiX		High-performance STM32 series (F4/F7/H7)	
MikroElektronika	VisualTFT	Compatible with MikroElektronika C/Basic/Pascal compilers		Component limit: 7
Segger	emWin GUI Builder			STemWin GUI Builder
TARA Systems	Embedded Wizard			ST evaluation edition

Audio tools	Product	Attributes, compatibility	Applicability	Free edition
DSP Concepts	AudioWeaver	Commercial Golden version of ST-AudioWeaver, MATLAB-ready	STM32F4/F7/H7	ST-AudioWeaver

State Machine tools	Product	Attributes, compatibility	Applicability	Free edition
IAR Systems	IAR Visual State	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

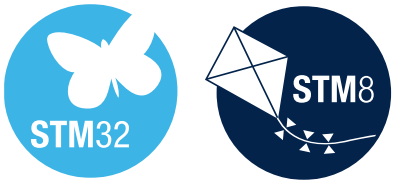| Code Analyzer	Product	Toolchain compatibility	Applicability	Free edition
Arm KEIL	MDK plugins	C/C++ code static analyzer, covering MISRA C:2012 and MISRA C++:2008. Provided by Gimpel Software and Parasoft Fully integrated with MDK5	All STM32	No
IAR Systems	IAR C-STAT	C/C++ code static analyzer, covering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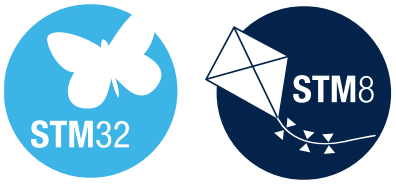
Hardware debug probes

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

Commercial Debug Probes			STM32	STM8	Description
Provider		Product			
IAR		I-jet	✓		
		I-jet Trace	✓		ETM, 256MB memory buffer
Arm KEIL		ULINK2	✓		ETM, Streaming trace
		ULINKpro	✓		ETM, Streaming trace
		ULINKplus	✓		ETM, Streaming trace
Segger		J-link	✓		Streaming trace
		J-link Trace	✓		ETM, 16MB memory buffer
iSystem		ic5000	✓	✓	ETM, 256MB memory buffer
		ic5700	✓		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
STM32CubeProg	✓		STM32 microcontroller Programmer tool
STLink-Utility	✓		Programmer based on ST-Link probe, including support for external memories
STVP (STM32) / STVP (STM8)	✓	✓	Programmer based on ST-Link probe
FLASHER-STM32 / FLASHER-STM8	✓	✓	Flash loader through UART
DfuSe	✓		Device firmware upgrader through USB, including support for external memories

Free ST Monitoring Tools	STM32	STM8	Description
STM32CubeMonitor	✓		STM32 microcontroller runtime variable monitoring and visualization tool
STM32CubeMonPwr	✓		STM32 microcontroller Power Monitor tool
STM32CubeMonRF	✓		STM32 microcontroller Radio Performance Monitor tool
STM32CubeMonUCPD	✓		STM32 microcontroller USB Type-C Power Delivery Monitor tool
STMStudio (STM32) / STMStudio (STM8)	✓	✓	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	TraceX	J-Link	ThreadX OS aware, Multi-core supported	Time limit: 30-day
Percepio	Tracealyzer	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	J-Scope	J-Link	Data visualization	FREE
	SystemView	J-Link	FreeRTOS/embOS aware	FREE

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

Full details about free edition available at IDE provider website

Releasing your creativity

STM32

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⌘ community.st.com

🌐 www.st.com/STM32SoftwareTools

Our technology starts with You

🌐 Find out more at www.st.com/STM32SoftwareTools

ST life.augmented