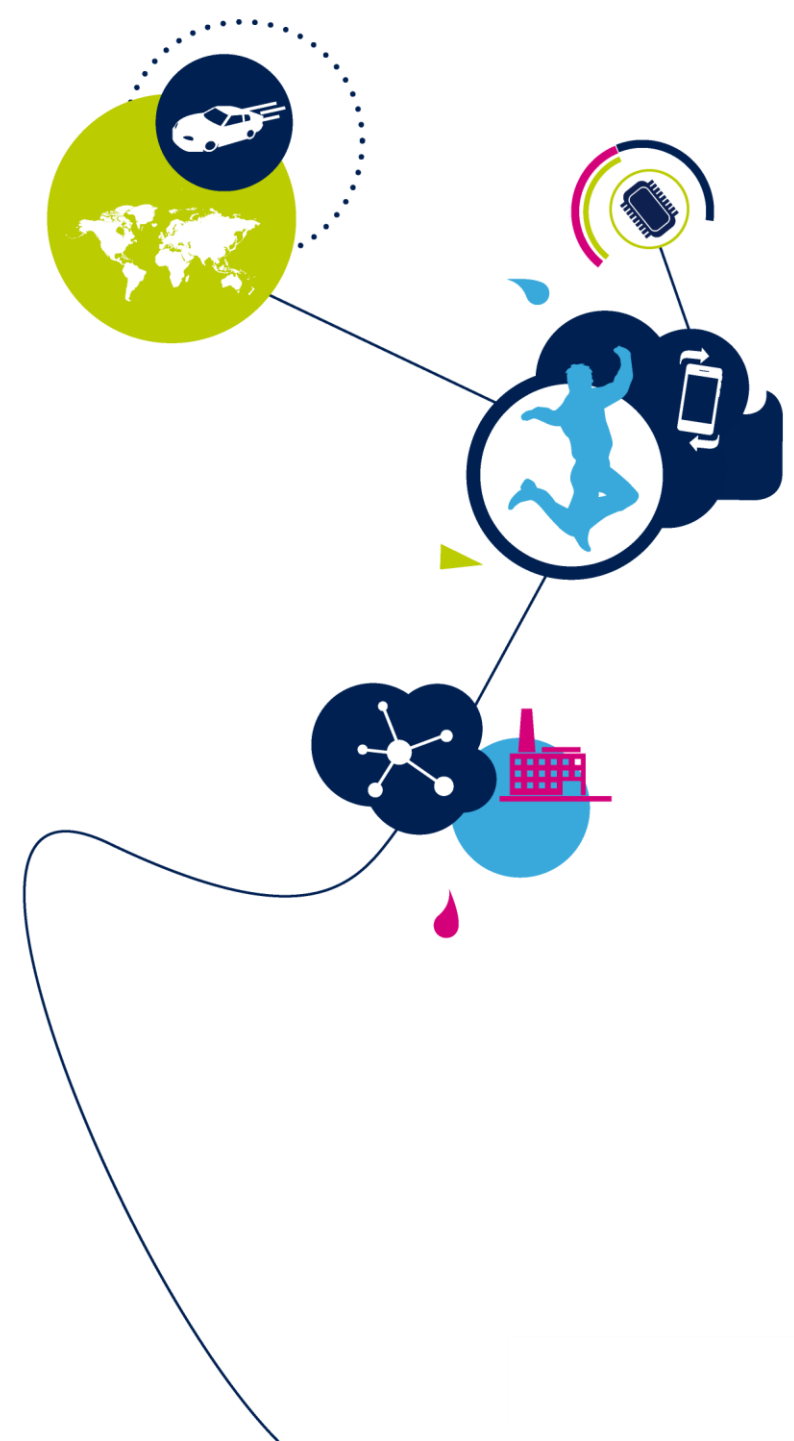




Software Development Tools

STM32 and STM8 Microcontrollers

January 2020



Software Development Tools - Overview

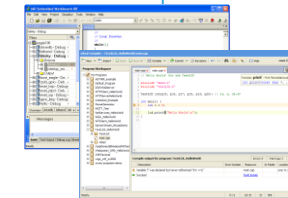


MCU/MPU Selection and Configuration



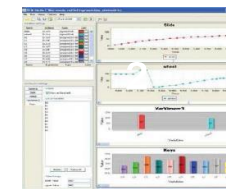
Integrated Development Environments

For **STM32**

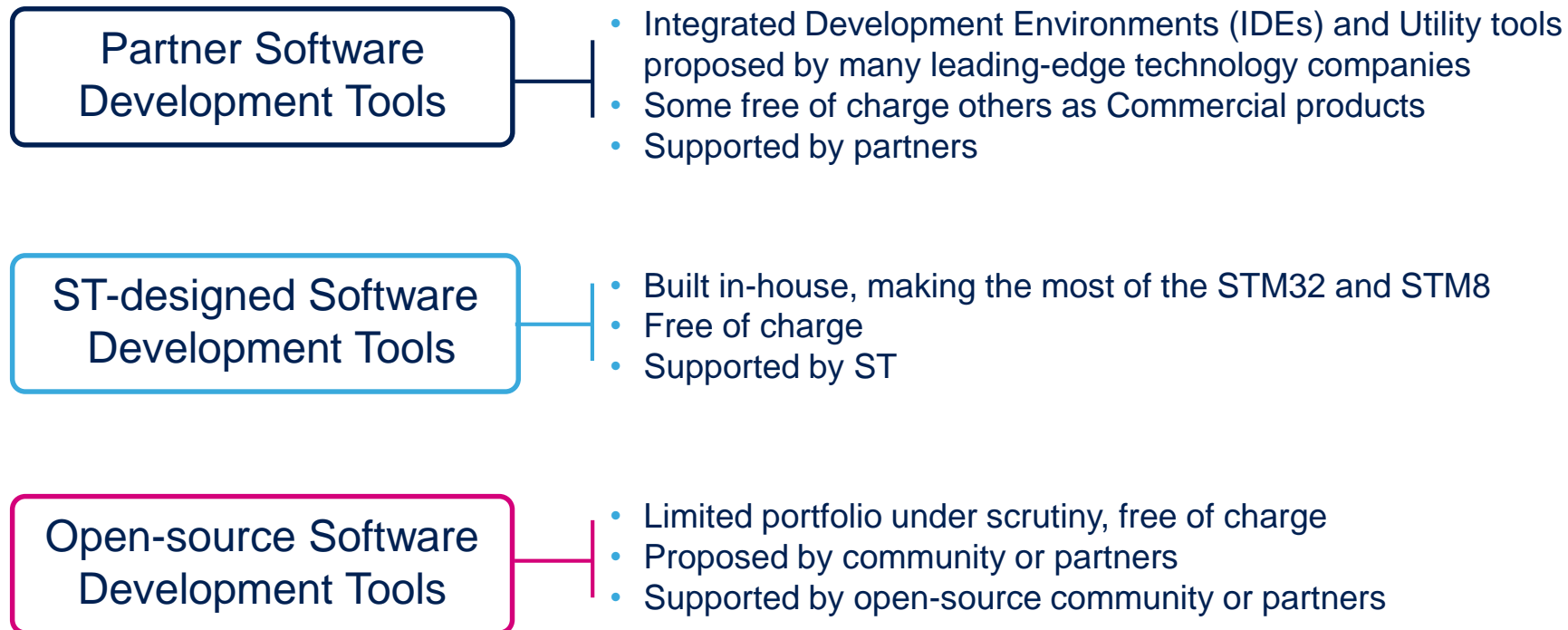


For **STM8**

MCU Utility Tools



- 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

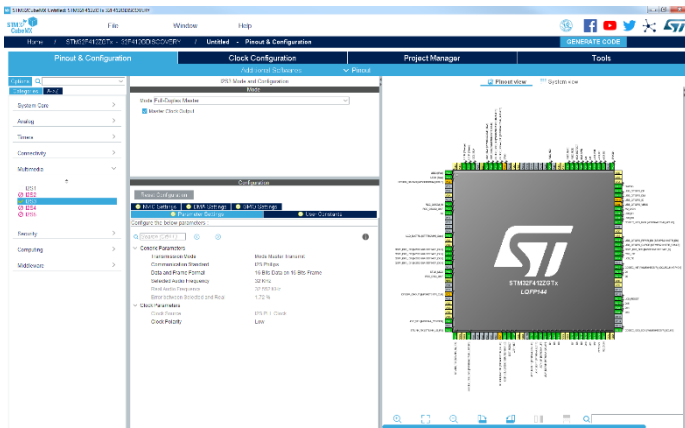




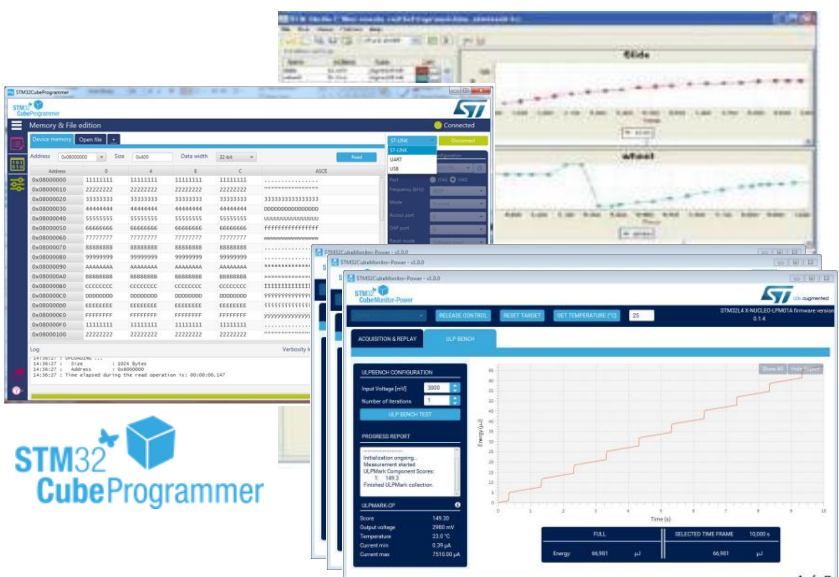
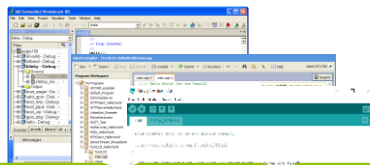
STM32 MCU Overview

4

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

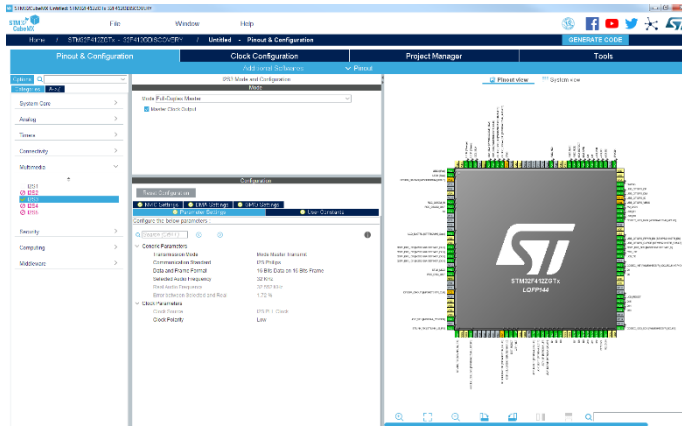




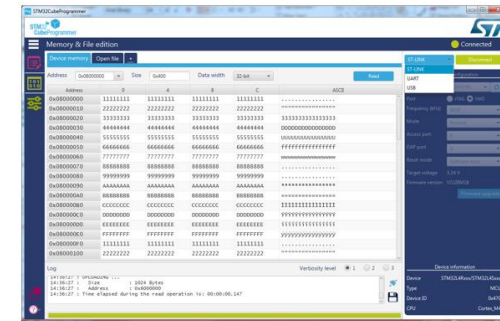
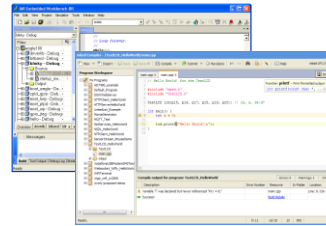
STM32 MPU Overview

5

A C/C++ flow in three steps



FREE
tools

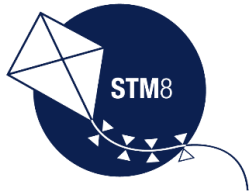


STM32CubeMX
Configure & Generate Code

ST and Partner tools
Compile and Debug

STM32CubeProgrammer
Program

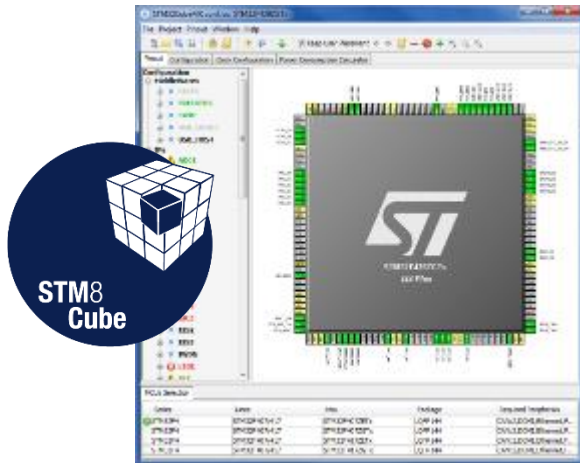




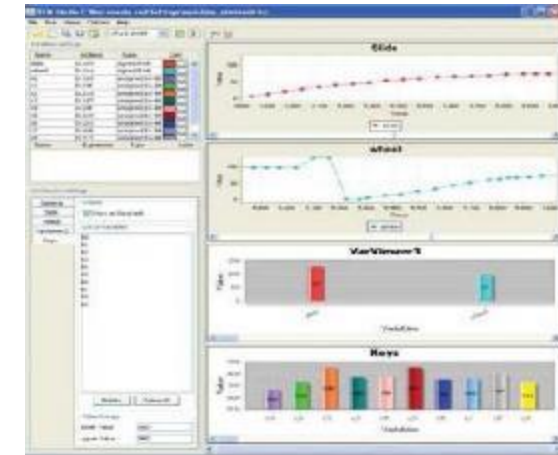
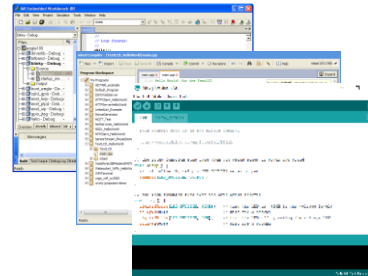
STM8 Overview

6

A C/C++ flow in three steps



FREE
IDEs



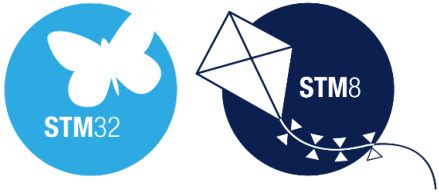
STM8CubeMX
Configure

ST and Partner IDEs
Compile and Debug

STVP, STLink-Util., STMStudio
Monitor & Program



MCU/MPU Selection and Configuration



Selection and Configuration

8

Free ST Tool	STM32		STM8	Description
	MCU	MPU		
ST-MCU-Finder	✓	✓	✓	Utility to select the MCU or MPU that best fits your application. Available for smartphone, tablet, and PC.
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



STM32 MCU IDE Portfolio



A Large Community of IDE Providers

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



life.augmented





STM32 Free IDEs

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

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



STM32 Commercial IDEs

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

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



IDE Centralized Online Resources

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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 MBED	Link	Link		In Blog		In Blog	Link	Link
Atollic TrueSTUDIO	Link	Link	Link	Link	Link	Link	Link	
ThunderBench	Link							Link
EWARM	Scattered Videos		Link	Scattered	Link	Link		Link
iSYS-WinIDEA						Link		Link
MDK5-Cortex-M	Scattered Videos	Link		Scattered	Link	Link		Link
Raisonance Ride7		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



STM32 MPU Tool Providers

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STM32 MPU Tools

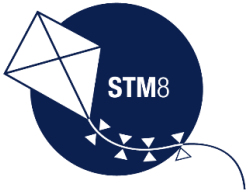
20

Provider	Product	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	Cortex-M	Cortex-M limited IDE	Code limit: 32KB	✓		
Crank Software Inc.	Storyboard Designer	Cortex-A	Graphical User Interface designer	Trial version	✓	✓	✓
IAR Systems	EWARM	Cortex-M	Cortex-M limited IDE	Code limit: 32KB	✓		
Qt	Qt Development Tools	Cortex-A	Graphical User Interface designer and IDE	Trial version			
STMicroelectronics	GPU tool kit	Cortex-A	Multi-purpose GPU toolkit	Yes	✓	✓	
	STM32CubeProg	All	Flash Programmer	Yes	✓	✓	✓
Timesys	TimeStorm IDE	Cortex-A	Cortex-A limited IDE	Time limit: 30-day	✓	✓	

STM32CubeProg is available as command line tool. The GUI edition is planned for Q4 2019



STM8 IDE Portfolio

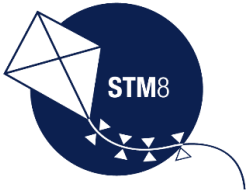


STM8 IDE Providers

25

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





STM8 IDEs

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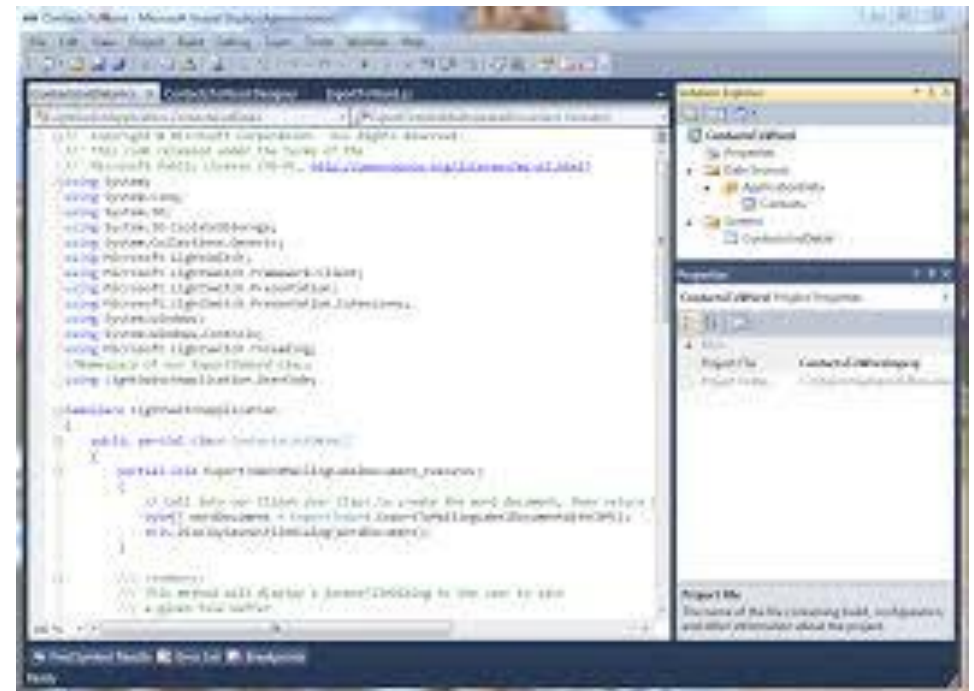
Provider	Product	Framework		Compiler	Debugger	Win	Linux	OS X	Free edition, limitations
		Proprietary	Eclipse						
Cosmic	IDEA	✓		Cosmic	Cosmic	✓			FREE, unlimited
STMicroelectronics	STVD	✓		Cosmic	STMicroelectronics	✓			FREE, unlimited
				Raisonance	STMicroelectronics	✓			Code limit: 2 Kbytes
IAR Systems	EWSTM8	✓		IAR	IAR	✓			Time limit: 30-day Code limit: 8 Kbytes
iSystem	iSYS-WinIDEA	✓		Cosmic	iSystem	✓			Time limit: 30-day
Raisonance	Ride7-STM8	✓		Raisonance	Raisonance	✓			Code limit: 2 Kbytes
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

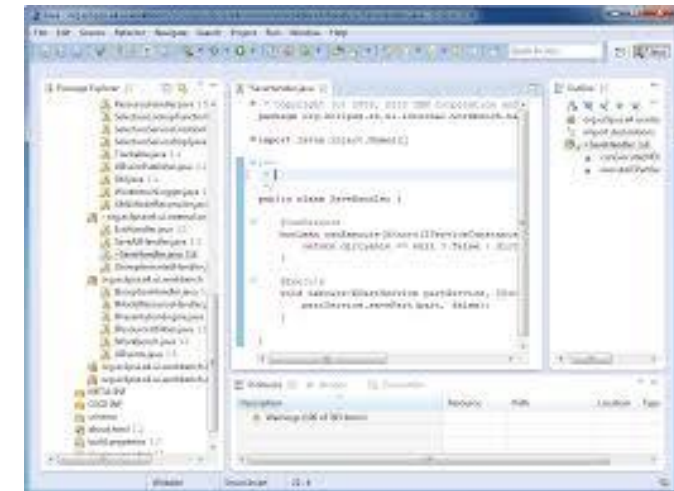
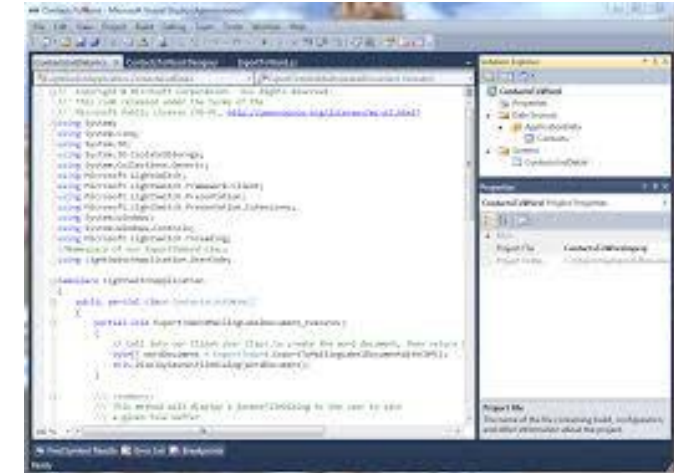
- IDEs allow more or less abstraction on:
 - The build/run/debug tools in use (compiler, linker, ...)
 - Environmental attributes (project structure, optimizations,)
 - Programming language attributes (compiled/Interpreted, syntax highlight at editing, ...)
 - User interface (GUI, browser, command line)
 - 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, Ivm, ARM or proprietary)
 - Common debugger (gdb or OpenOCD)
 - RTOS and C/C++ standard libraries in source form
 - Locally stored



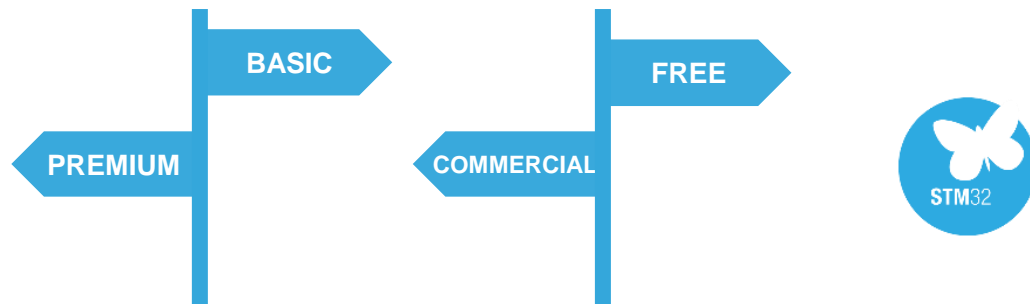
General-purpose IDE Families

30

- 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

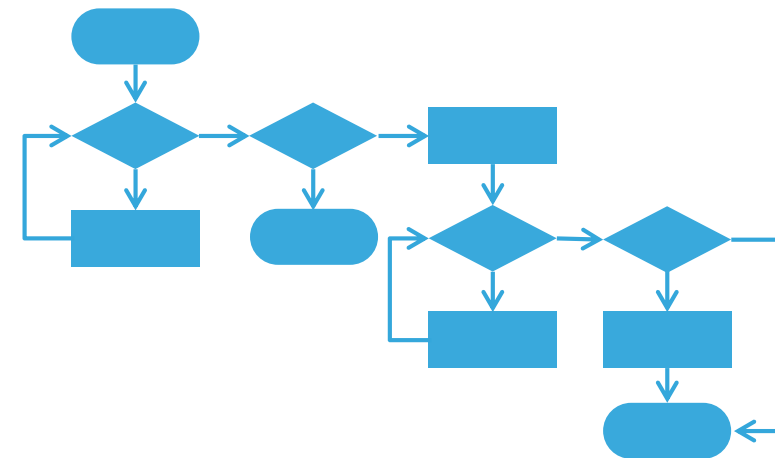


- IDE feature set varies at tool edition
 - Basic IDEs allow minimal features
 - Premium IDEs allow much powerful editing, debug, trace, optimization tools and safety certified editions
 - Free-of-charge editions allow IDE early discovery
 - Feature demoted
 - Time limited
 - Special editions for a given 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

35

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

arm KEIL

DSP CONCEPTS

expresslogic

IAR
SYSTEMS

1 SYSTEM

Micrium
Empowering Embedded Systems

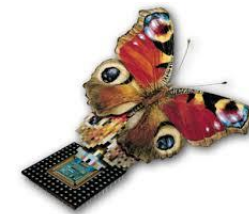
MIKROE

percepio
Stop guessing!

pls
Development Tools

SEGGER

ST
life.augmented



Embedded Wizard

ST
life.augmented



ST STM32 MCU Code Generators

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

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



Partner STM32 Code Generators

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GUI Builder	Product	Toolchain compatibility	Applicability	Free edition
ExpressLogic	GuiX	Compatible with MikroElektronika C/Basic/Pascal compilers	High-performance STM32 series (F4/F7/H7)	
MikroElektronika	VisualTFT			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



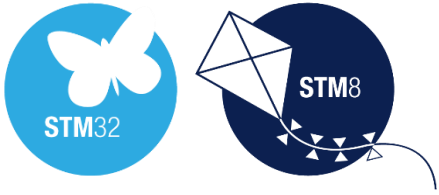
STM32 application-specific configuration tools generate code integrating the related software library
Free edition highlights the most attractive option. Full details available at IDE provider website



Partner STM32 Code Analyzers

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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

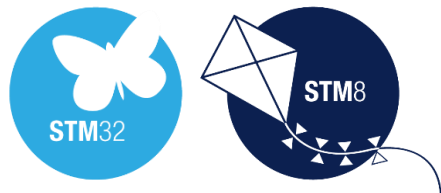
39

ST Debug Probes	On-board	STM32	STM8	Description
<u>ST-Link v2</u>		✓	✓	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
<u>ST-Link v3S</u>		✓		Latest generation stand-alone hardware debug probe available as commercial product



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





ST Program/Monitor Tools

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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
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



STM32 Partner Monitor/Trace Tools

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Monitor/Trace	Product	Channel	OS awareness and IDE compatibility	Free edition
ExpressLogic	TraceX	J-Link	ThreadX OS aware, Multi-core supported	Time limit: 30-day
Micrium	uc/Probe	J-Link	uc-OS aware, CMSIS-DAP ready, IAR plug-in available	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

Thank You

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 community.st.com



www.st.com/STM32SoftwareTools