

Integrated Development Environment e² studio

How to use Jenkins to automate build and report

Introduction

Jenkins is an automation engine with an unparalleled plugin ecosystem to support many tools in delivery pipelines, whether the goal is continuous integration, automated testing, or continuous delivery.

This application note guides user to use Jenkins to automate the build and report (of build status) of a project created by Renesas e^2 studio environment.

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1. Overview

1.1 Purpose

This document guides user to use Jenkins to automate building for projects created by e² studio.

1.2 Operating Environment

Renesas have confirmed the operation procedure explained in this document in the following environment.

OS	Windows 10 x64		
IDE	e ² studio 2022-01		
Jenkins	2.332.2		
Git	2.35.1		
In this document uses the following target device and toolchain with an example project.			

Target device	RX64M
Target toolchain	GCC for Renesas RX 8.3.0.202104-GNURX-ELF



2. Getting started with Jenkins

This chapter describes the Jenkins installation, setup, and Git plugin installation instructions.

2.1 Installing Jenkins

The Jenkins installer can be downloaded by jumping to the download page from the following URL.

https://www.jenkins.io/

You have to select the correct package according to your environment OS (e.g. Windows or Linux...), type of operation mode (standalone or servlet). This Application Note is specifically targeted to stand-alone installation on Windows 10. Please select option to download file "jenkins.war".

Java must be installed before installing Jenkins.

1) Browse above page on your browser and jump to download page for downloading Jenkins installer. Click "Windows" and starts to download "Jenkins.msi" file.

Jenkins download and deplo	yment
The Jenkins project produces two release lines: Stable (LTS) and regular (\ other. See the links below for more information and recommendations al	Weekly). Depending on your organization's needs, one may be preferred over the bout the release lines.
Stable (LTS)	Regular releases (Weekly)
Long-Term Support (LTS) release baselines are chosen every 12 weeks from the stream of regular releases. Every 4 weeks we release stable releases which include bug and security fix backports. Learn more	This release line delivers bug fixes and new features rapidly to users and plugin developers who need them. It is generally delivered on a weekly cadence. Learn more
Changelog Upgrade Guide Past Releases	Changelog Past Releases
Downloading Jenkins Jenkins is distributed as WAR files, native packages, installers, and Dockee 1. Before downloading, please take a moment to review the Hardwar 2. Select one of the packages below and follow the download instruct 3. Once a Jenkins package has been downloaded, proceed to the Inst	e and Software requirements section of the User Handbook. ions.
Jenkins is distributed as WAR files, native packages, installers, and Docker 1. Before downloading, please take a moment to review the Hardwar 2. Select one of the packages below and follow the download instruct	e and Software requirements section of the User Handbook. ions. alling Jenkins section of the User Handbook.
Jenkins is distributed as WAR files, native packages, installers, and Docker 1. Before downloading, please take a moment to review the Hardwar 2. Select one of the packages below and follow the download instruct 3. Once a Jenkins package has been downloaded, proceed to the Inst 4. You may also want to verify the package you downloaded. Learn m	e and Software requirements section of the User Handbook. ions. alling Jenkins section of the User Handbook. ore about verifying Jenkins downloads.
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Jenkins is distributed as WAR files, native packages, installers, and Docker 1. Before downloading, please take a moment to review the Hardwar 2. Select one of the packages below and follow the download instruct 3. Once a Jenkins package has been downloaded, proceed to the Inst 4. You may also want to verify the package you downloaded. Learn me (b) Download Jenkins 2.332.2 LTS for: Generic Java package (war) 544-256. claux1718094178002204007151471800400939848856588244673117c	e and Software requirements section of the User Handbook. ions. alling Jenkins section of the User Handbook. ore about verifying Jenkins downloads. Download Jenkins 2.342 for: Generic Java package (war) SH4-356 TR334068455eard48136417204886664174014991c7651676648865550
Jenkins is distributed as WAR files, native packages, installers, and Docker 1. Before downloading, please take a moment to review the Hardwar 2. Select one of the packages below and follow the download instruct 3. Once a Jenkins package has been downloaded, proceed to the Inst 4. You may also want to verify the package you downloaded. Learn m	e and Software requirements section of the User Handbook. ions. alling Jenkins section of the User Handbook. ore about verifying Jenkins downloads. Download Jenkins 2.342 for: Generic Java package (war) SHA-556.7b2040be3uf5acd1220aa866bcd17ab1c691c7d51c7t6d1e8tcds5552 Docker

Figure 1

- 2) After downloaded that file, run it.
- 3) Jenkins installer is appeared, proceed to answer some questions on the wizard pages. And complete the installation of Jenkins.

2.2 Starting Jenkins

After completed installation of Jenkins, click <u>http://localhost:8080</u> for starting Jenkins.

 [Unlock Jenkins] page is appeared at the first time Jenkins execution. Copy the password from the file "initialAdminPassword" from Jenkins home folder, for example "C:\ProgramData\jenkins\.jenkins\secrets\initialAdminPassword", and paste to the "Administrator password" textbox, then press [Continue].





Figure 2

2) Next, you will be asked to install plugin. You can do it later, then just close this dialog.



Figure 3

3) In the next dialog, just press [Start using Jenkins].



Getting Started	
Jenkins is ready!	
You have skipped the setup of an admin user .	
To log in, use the username: "admin" and the administrator password you used to access the setup wizard.	
You have skipped the configuration of the Jenkins URL. To configure the Jenkins URL, go to "Manage Jenkins" page.	
Your Jenkins setup is complete.	
Jenkins 2.332.2	

Figure 4

4) Then the Jenkins UI will be shown.

🙀 Jenkins		Q Search	⑦ 1 1	💄 admin 🛛 🛨 log ou
Dashboard >				
쓸 New Item				Add description
Reople Build History		Welcome to	o Jenkins!	
Manage Jenkins		This page is where your Jen builds or start building a so	kins jobs will be displayed. To get started, ftware project.	you can set up distributed
🍓 My Views		Start building you	r software project	
File New View		Create a job		\rightarrow
Build Queue	^	Set up a distribute	ed build	
No builds in the queue.		Set up an agent		\rightarrow
Build Executor Status	^	Configure a cloud		
1 Idle		Configure a cloud		\rightarrow
2 Idle		Learn more about distri	buted builds	9

Figure 5

2.3 Adding more users

By default, Jenkins provides 1 user admin with the password mentioned in before chapter. In case that you would like to add more accounts for other users, follow below steps:

1) In the Jenkins UI, click [Manage Jenkins] > [Manage Users].





Figure 6

- 2) In the "Users" page, click [Create User].
- 3) In the "Create User" page, input the user information such as: username, password, full name. Press [Create User].
- 4) After user account is created, the username and password can be used to login to Jenkins web UI.

Note: In the "Users" page, user can also change the login password or update other settings by clicking on

gear 🧐 button.

2.4 Configuring Jenkins

You can get the various configuration options for Jenkins by clicking the [Manage Jenkins] > [Configure Systems].



Figure 7

Sections below are some of the Jenkins configuration settings which can be carried out.

2.4.1 Multiple Build



This refers to the total number of concurrent job executions that can take place on the Jenkins machine. This can be changed based on requirements. Sometimes the recommendation is to keep this number the same as the number of CPU on the machines for better performance.

# of executors	
8	\$



2.4.2 Environment Variables

This is used to add custom environment variables which will apply to all the jobs. These are key-value pairs and can be accessed and used in Builds wherever required.

Global properties	
 Environment variables List of variables ? 	
Name	
Value	
Del	ete
Add	
Figure 9	



2.5 Jenkins URL

By default, the Jenkins URL points to <u>http://localhost:8080</u> if you access on the same machine. If you have a domain name setup for Jenkins machine, set this to the domain name else overwrite localhost with IP of machine. While sending out links using the email you can directly access the Jenkins URL using the environment variable JENKINS_URL which can be accessed as \${JENKINS_URL}.

2.6 Installing Git plugin

Git plugin helps Jenkins to contact Git repository to retrieve the source code via internet connection. To install Git plugin, please follow below steps (it requires internet connection):

1) In the Jenkins UI, click [Manage Jenkins] > [Manage Plugins].





- 2) In the next screen, click the [Available] tab. This tab will give a list of plugins which are available for downloading. In the [Search] textbox type "Git" to filter the list.
- 3) Check the Git Plugin option and click on the button "Install without restart". The installation will then begin, and the screen will be refreshed to show the status of the download.

👰 Jenkins	Q Search	⑦ ▲ admin → log out
Dashboard 🔸 Plugin Manager		
 Back to Dashboard Manage Jenkins Update Center 	Plugin Manager Updates Available Installed Advanced	Q_ <u>Git</u>
	Install Name ↓	Released
	Git 4.11.0 git Source Code Management This plugin integrates Git with Jenkins.	22 days ago
	Git client 3.11.0 Library plugins (for use by other plugins) Utility plugin for Git support in Jenkins	3 mo 17 days ago
	Install without restart Download now and install after	er restart Update information obtained: 9 hr 29

Figure 11

4) Once all installations are complete, restart Jenkins by closing the browser, then log in to Jenkins again.



Figure 12

5) After Jenkins is restarted, Git will be available as an option whilst configuring jobs. You can verify it in next section.

You need to install Git first by following the instructions in the next chapter before performing the following operations.

6) In the Jenkins UI, click [Manage Jenkins] > [Global Tool Configuration].





7) In the next screen, check the setting of [Path for Git execution program]. If you can see the following error message, update the path for Git execution program.

Dashboard 🔸 Global Tool Configurat	ion	^
	Git	
	Git installations	
	Git	
	Name	
	Default	
	Path to Git executable ?	
	git.exe	
	There's no such executable git.exe in PATH: C:/Program Files/Eclipse Adoptium/jdk- 11.0.14.101-hotspot/bin, C:/WINDOWS/system32, C:/WINDOWS,	
	Save Apply	-

Figure 14

8) Error disappeared when you specify correct path.

Git	
Git installations	
Git	
Name	
Default	
Path to Git executable ?	
C:\Users	
)

Figure 15

9) Click [Save] button.

Git will be available as an option whilst configuring jobs.



3. Installing Git tools

The previous section describes how to install the git plugin to make Jenkins git aware. The underlying git tools, that Jenkins will use, must be installed on the host you intend running the Jenkins server on. If you're not sure if git is already installed, then the following steps will help.

3.1 Is git already installed?

1) Enter the following command from a Windows Command Prompt, on the machine where the Jenkins server will run (you can run it directly on the server machine, or remotely login to the server from client machine, then run it):

```
> git --version
```

2) If git is already installed, the version number is returned, for example:

git version 2.35.1.windows.2

3) If git is not installed, the following response is displayed:

```
'git' is not recognized as an internal or external command, operable program or batch file.
```

3.2 Git Installation

1) To install "git for windows", jump to the download page from the following URL and select the git installer download most appropriate for your system.

https://git-scm.com/

2) Run the installer.





 In the Git Setup installer click Next and accept the default values until "Adjusting your PATH environment". On this page, choose the middle option, "Use Git from the Windows Command Prompt".





4) Continue and accept the remaining default options and complete the install.

No further installation or configuration is required at this stage. Jenkins allows you to configure the user identity and credentials, and this is described in the next chapter.



4. Setting up a build job

This chapter describes how to create a job in Jenkins which picks up a simple project created using e² studio and builds it.

4.1 Creating a build job

- 1) In the Jenkins UI, click [New Item].
- 2) In the next screen, enter "e2Build" in the [Enter an item name] textbox. Choose the "Freestyle project" option, then click [OK].

🙀 Jenl	cins	Q Search	? 🛕 🚺 💄 adm	in 🕁 log out
Dashboard	All >			
	Enter an item name e2Build » Required field			
		ns. Jenkins will build your project, comb for something other than software bui		

Figure 18

3) The following screen will come out in which you can specify the details of the job.

🧌 Jenkins	Q Search	② 1 2 ad	min 🔿 log out
Dashboard → e2Build →			
General Source Code Manag Post-build Actions Description	gement Build Triggers Build Envi	ironment Build	
[Plain text] Preview Discard old builds ? This project is parameterized Disable this project ? Execute concurrent builds if no Save		Advanced	

Figure 19

4) [Source Code Management]: we need to specify the Git repository which stores the project. We will assume that a Git repository (for example "\\192.168.0.43\Shared\EGitRepo") has been setup which contains a "rx64m_sample" project. Please refer to Application Note Integrated Development Environment e² studio: How to use EGit in e² studio Rev.1.01 (renesas.com) for details.



Dashboard + e2Build +							
	General Source Code Management	Build Triggers Build Environment	Build				
	Post-build Actions						
	Source Code Management						
	O None Git ? Repositories ?						
	Repository URL ?						
	Credentials ? - none - ♥ ●Add ♥						
	Save Apply		Advanced	Ţ			



- 5) Fill in the repository URL. Then Click [Add] next to the "Credentials" textbox to add the credential to login to the machine of Git repository. In the "Jenkins Credentials Provider: Jenkins" dialog, input following information: The added credential will be listed in the list box "Credential" under "Repository URL" text box. Select the credential.
- 6) [Build Triggers]: Plan the build schedule. In order to build whenever the project is updated on Git repository, select "Poll SCM" option. This will check the Git repository periodically for new update then trigger the build if there is any update.
- 7) The period to check Git repository is specified in cron-like syntax. For example: "H/15 * * * *" means to check Git repository every 15 minutes. Click the question mark Figure next to "Schedule" caption of the textbox for details.

Dashboard + e2	Build	^
	General Source Code Management Build Triggers Build Environment Build	
	Post-build Actions	
	Build Triggers	
	 Trigger builds remotely (e.g., from scripts) ? Build after other projects are built ? Build periodically ? Poll SCM ? Schedule ? 	ł
	H/15 * * * *	
	Save Apply 6	

8) [Build]: Select Click "Execute Windows batch command" on the [Add build step] dropdown list.



Post-build Actions uild Execute Window Command Cd %WORKSPACE/ E:\Renesas\e2	s batch command		Build Environment	Build	
uild Execute Window ? Command cd %WORKSPACE5 E:\Renesas\e2	%			X	
Execute Window ? Command cd %WORKSPACE5 E:\Renesas\e2	%			X	
? Command cd %WORKSPACE5 E:\Renesas\e2	%			X	
E:\Renesas\e2					
-import Sample	rg.eclipse.cdt.ma	nagedbuilder.cor	c.exe -nosplash -de re.headlessbuild -d	ata C:\workspace	
See the list of ava	ilable environment v	variables			
Execute Windows bat	ch command			Advanced	
Execute shell Invoke top-level Mave	en targets			Advanced	
Add build step 🔺					
	See the list of ava Execute Windows bat Execute shell Invoke top-level Mav	See the list of available environment of Execute Windows batch command Execute shell Invoke top-level Maven targets	Execute shell Invoke top-level Maven targets	See the list of available environment variables Execute Windows batch command Execute shell Invoke top-level Maven targets	See the list of available environment variables Execute Windows batch command Execute shell Invoke top-level Maven targets

9) In the command window, enter the following commands and then click [Save] button.

```
cd %WORKSPACE%
<e2 studio install folder>\eclipse\e2studioc.exe -nosplash -debug -
consolelog -application org.eclipse.cdt.managedbuilder.core.headlessbuild
-data <workspace folder> -import project name> -cleanBuild all
```

- <e2 studio install folder> : You specify the install directory of e2 studio.
- e2studioc.exe : When you use e2 studio 2021-10 or earlier version, you replace it to eclipsec.exe.
- <workspace folder> : You need to specify the workspace as usually even though the headless build do not use e2 studio UI. You specify a folder of workspace exclude your project.
- <project_name> : You specify the project name registered in the Git repository. Here, specify "SampleEGit".
- 10) Click [Save] button. The configuration of Build job is completed.

4.2 Executing a build job

 Click on [Build Now] to see if you have successfully defined the job. Then the job is scheduled and run (this is for testing the build only, the job will be triggered when new source code is committed to Git repository).



🧌 Jenkins			Q	Search	?	<u>1</u>	admin → log	out
Dashboard >								- 1
쯜 New Item							Add description	
🍓 People		All	+					- 1
Build History								. 1
🏠 Manage Jenkins		s	w	Name ↓ Last Succe	ess Last Failur	re Last Du	ration	
🍓 My Views		$\overline{\mathbf{O}}$	XÔX	e2Build N/A	N/A	N/A	\triangleright	
🔚 New View				Changes	Atom	Atom feed	 Atom feed for just 	
Build Queue	^	Icon: S	М	Build Now	feed for all	for failures	a Atom feed for just latest builds	
No builds in the queue.				Configure				
				🚫 Delete Project				
Build Executor Status	^			Git Polling Log				
1 Idle				Z Rename				

Figure 23

2) Once the build is completed, build status will be shown. Click [#1] in the "Build history" to bring up the details of the build.

🧌 Jenkins	Q Search (2)	L admin → log out
Dashboard + e2Build + #1		
🔶 Back to Project	✓ Build #1 (Apr 19, 2022, 2:	Keep this build forever
🔍 Status	• Duild #1 (Apr 13, 2022, 2	Started 55 sec ago
Changes	Add description	Took 18 sec
Console Output	No changes.	
Edit Build Information	Started by user admin	
🚫 Delete build '#1'	♦ git Revision: 4016cb8c2fee6d24cfd0a417bee8377c16eaf4ab	
🚯 Git Build Data	Repository: \\192.168.0.43\Shared\EGitRepo refs/remotes/origin/master	

Figure 24

3) In the summary page of build #1, click [Console Output] to see the details of the build.





Figure 25

4) Open a source file in e² studio, update it, commit and push to repository. Then after the period defined in "Poll SCM"), the job will be started automatically.



5. Website and Support

• e² studio

https://www.renesas.com/software-tool/e-studio

- Jenkins
 <u>https://jenkins.io/</u>
- Git
 <u>https://git-scm.com</u>



Revision History

		Description	
Rev.	Date	Page	Summary
1.01	Apr 20.22	All	Revise all pages based on "R20AN0524JE0101".



General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.

2. Processing at power-on

The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power is supplied until the power is supplied until the power reaches the level at which resetting is specified.

3. Input of signal during power-off state

Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.

4. Handling of unused pins

Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.

5. Clock signals

After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.

6. Voltage application waveform at input pin

Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).

7. Prohibition of access to reserved addresses

Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.

8. Differences between products

Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a systemevaluation test for the given product.

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- 8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
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(Rev.4.0-1 November 2017)

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