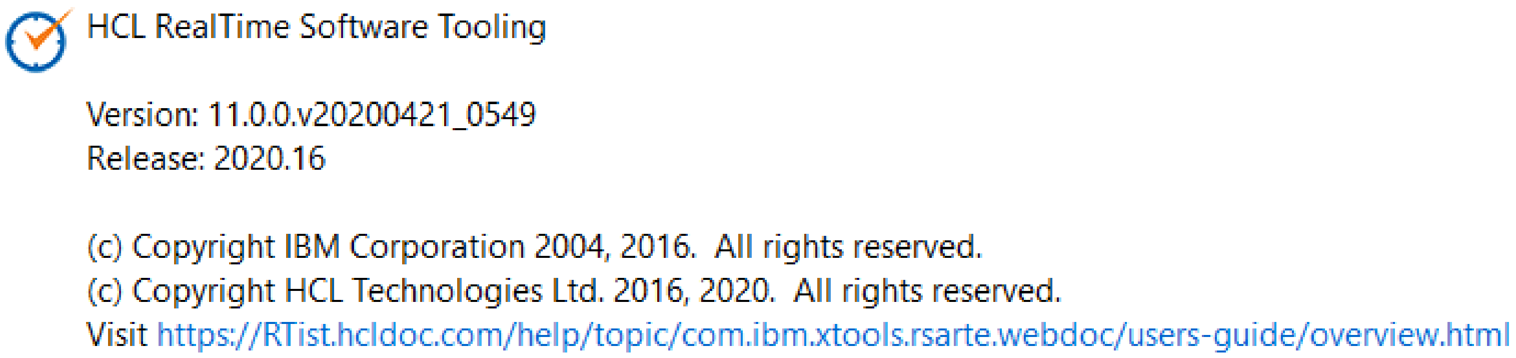
What’s New in HCL RTist 11

updated for release 2020.16

HCL SOFTWARE

Overview

- RTist 11 is based on Eclipse 2019.06 (4.12)
- HCL RTist is 100% compatible with IBM RSARTE. All features (with very few exceptions) are the same.



HCL RealTime Software Tooling

Version: 11.0.0.v20200421_0549
Release: 2020.16

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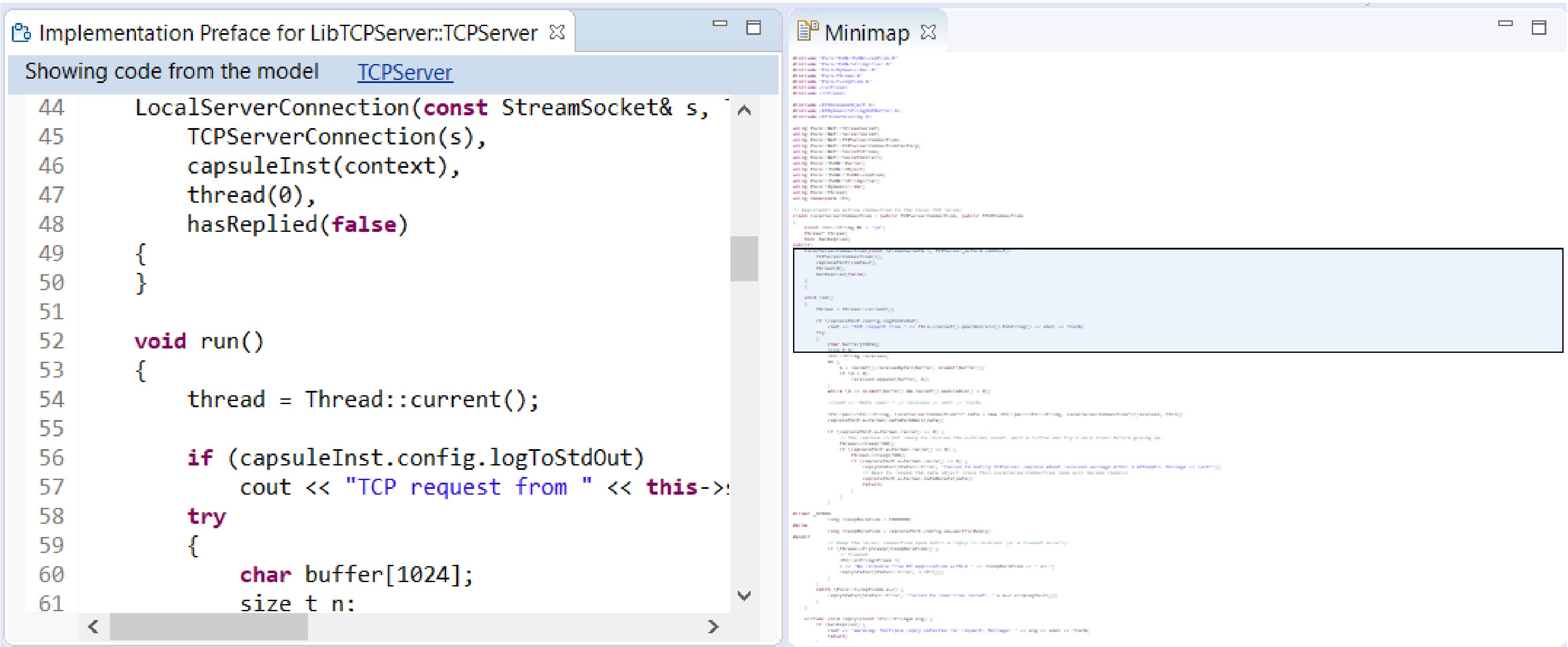
Visit https://RTist.hcldoc.com/help/topic/com.ibm.xtools.rsarte.webdoc/users-guide/overview.html

Eclipse 4.12 (2019.06)

- Compared to RTist 10.3, RTist 11 includes new features from 4 quarterly Eclipse releases:
  - 2018.09 (https://www.eclipse.org/eclipse/news/4.9/platform.php)
  - 2018.12 (https://www.eclipse.org/eclipse/news/4.10/platform.php)
  - 2019.03 (https://www.eclipse.org/eclipse/news/4.11/platform.php)
  - 2019.06 (https://www.eclipse.org/eclipse/news/4.12/platform.php)
- For full information about all improvements and changes in these Eclipse releases see the links above
  - Some highlights are listed in the next few slides...

Eclipse 4.12 (2019.06)

- A new Minimap view gives a better overview of the text editor contents (useful when it's large)
  - It's easy to launch it by typing "minimap" in the QuickAccess field



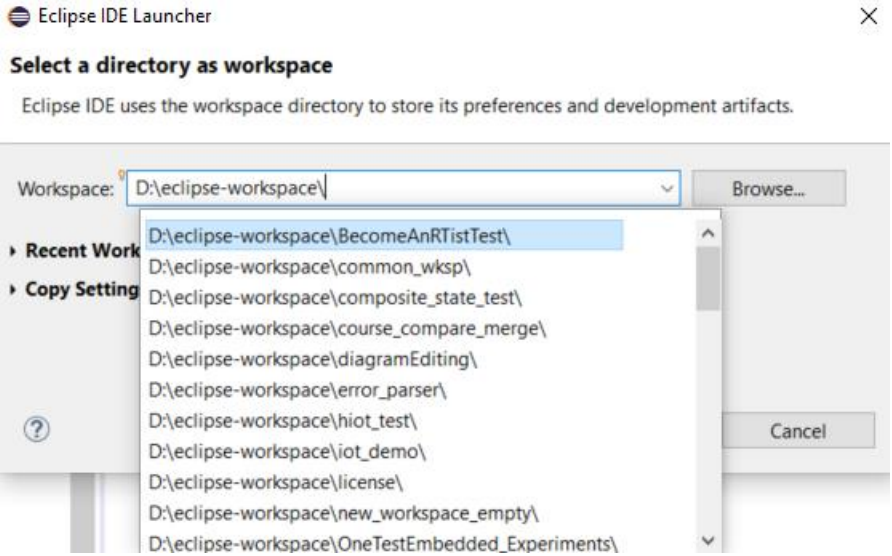
Showing code from the model TCPServer

```
    LocalServerConnection(const StreamSocket& s,
        TCPServerConnection(s),
        capsuleInst(context),
        thread(0),
        hasReplied(false)
    {
    }

    void run()
    {
        thread = Thread::current();

        if (capsuleInst.config.logToStdOut)
            cout << "TCP request from " << this->
        try
        {
            char buffer[1024];
            size_t n;
```

Eclipse 4.12 (2019.06)

- The Select Workspace dialog now supports auto-completion
  - Allows to pick a workspace more easily by only using the keyboard

- User-defined filtering of the Project Explorer
  - You can now create your own regular expressions for filtering out items from the Project Explorer
  - Can be used as an alternative to working sets

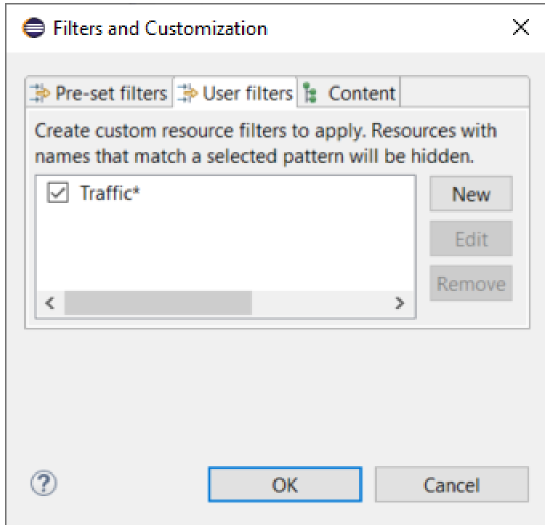


Select a directory as workspace

Eclipse IDE uses the workspace directory to store its preferences and development artifacts.

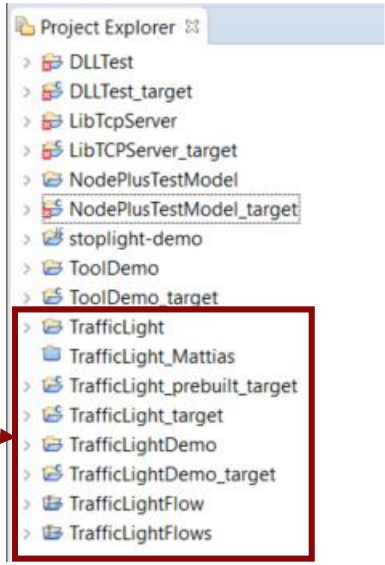
Workspace: D:\eclipse-workspace\

D:\eclipse-workspace\BecomeAnRTistTest\
D:\eclipse-workspace\common_wksp\
D:\eclipse-workspace\composite_state_test\
D:\eclipse-workspace\course_compare_merge\
D:\eclipse-workspace\diagramEditing\
D:\eclipse-workspace\error_parser\
D:\eclipse-workspace\hiot_test\
D:\eclipse-workspace\iot_demo\
D:\eclipse-workspace\license\
D:\eclipse-workspace\new_workspace_empty\
D:\eclipse-workspace\OneTestEmbedded_Experiments\



Create custom resource filters to apply. Resources with names that match a selected pattern will be hidden.

☑ Traffic*

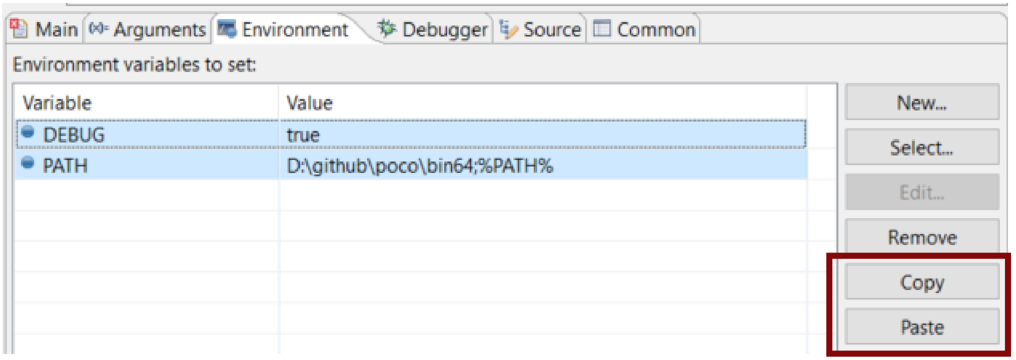


DLLTest
DLLTest_target
LibTcpServer
LibTCPServer_target
NodePlusTestModel
NodePlusTestModel_target
stoplight-demo
ToolDemo
ToolDemo_target
TrafficLight
TrafficLight_Mattias
TrafficLight_prebuilt_target
TrafficLight_target
TrafficLightDemo
TrafficLightDemo_target
TrafficLightFlow
TrafficLightFlows

will be hidden by the user filter

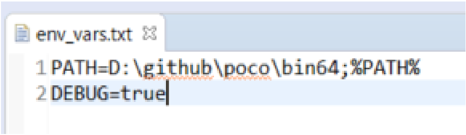
Eclipse 4.12 (2019.06)

- Copy/Paste of environment variables
  - Setting up environment variables in a launch configuration is now much easier thanks to copy/paste support
  - Environment variables can be copied from one launch configuration to another, or from a text editor to a launch configuration (or vice versa)



Environment variables to set:

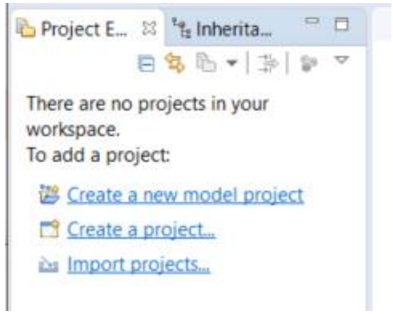
Variable	Value
DEBUG	true
PATH	D:\github\poco\bin64;%PATH%



env_vars.txt

```
PATH=D:\github\poco\bin64;%PATH%
DEBUG=true
```

- Useful quick links for an empty workspace
  - Quick links for creating or importing projects make it easier for new users to get started with an empty workspace
  - Which quick links that are shown depend on the current perspective

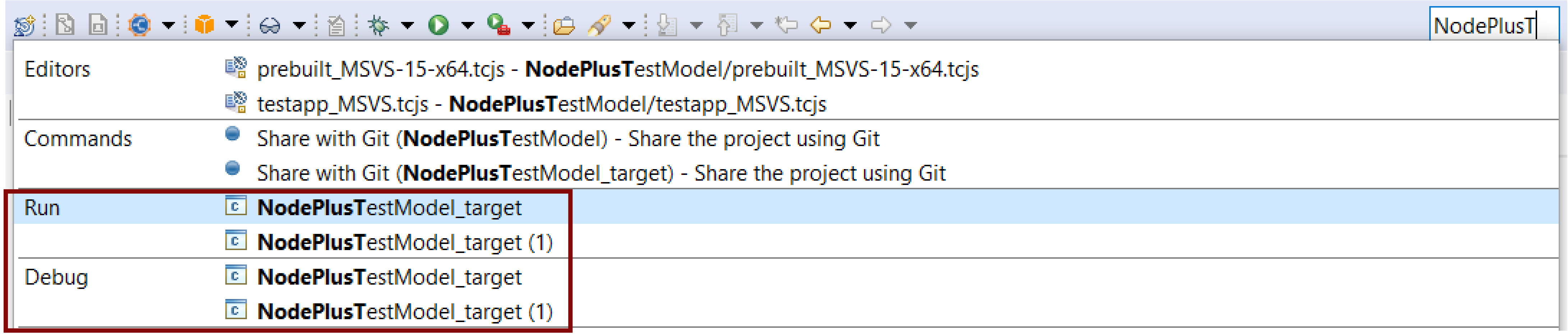


There are no projects in your workspace.
To add a project:

- Create a new model project
- Create a project...
- Import projects...

Eclipse 4.12 (2019.06)

- Launch configurations are now accessible from Quick Access
  - Can start either a Run or a Debug session

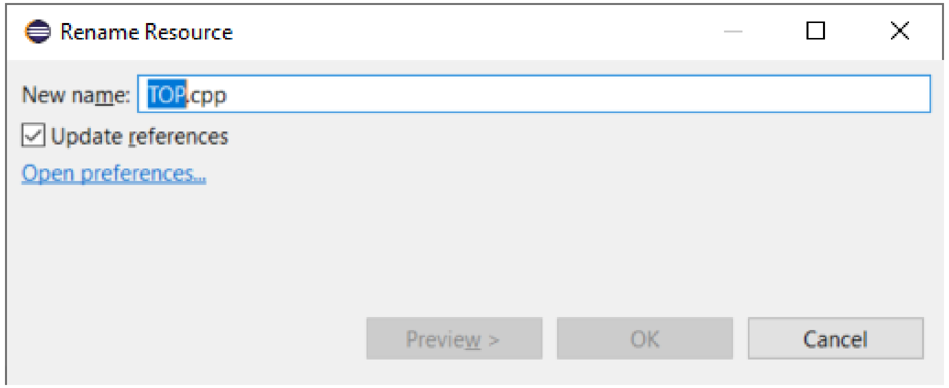


NodePlusT

Editors	prebuilt_MSVS-15-x64.tcjs - **NodePlusT**estModel/prebuilt_MSVS-15-x64.tcjs
	testapp_MSVS.tcjs - **NodePlusT**estModel/testapp_MSVS.tcjs
Commands	Share with Git (**NodePlusT**estModel) - Share the project using Git
	Share with Git (**NodePlusT**estModel_target) - Share the project using Git
Run	**NodePlusT**estModel_target
	NodePlusTestModel_target (1)
Debug	**NodePlusT**estModel_target
	NodePlusTestModel_target (1)

CDT 9.8 (included as part of Eclipse 2019.06)

- Possible to rename a file without triggering a refactoring
  - A checkbox controls if references to the renamed file should be updated

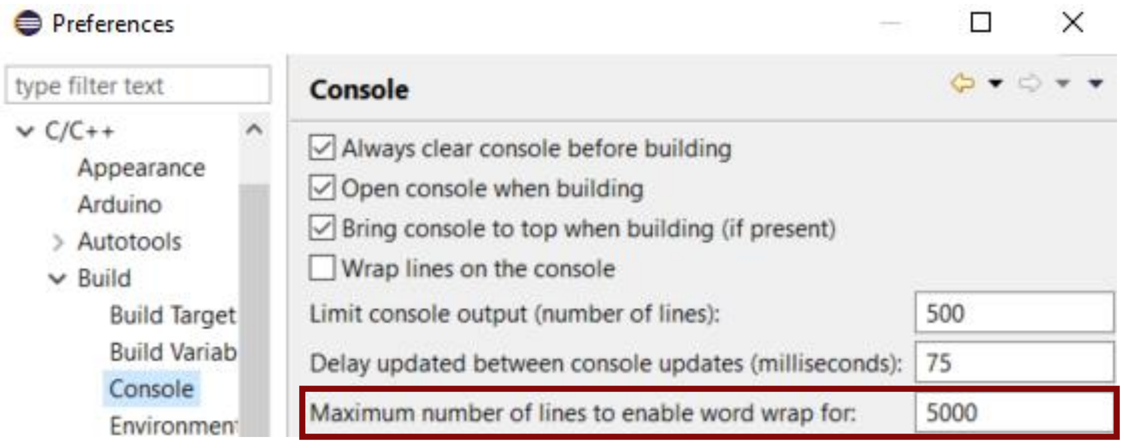

Rename Resource

New name: TOP.cpp

☑ Update references

Open preferences...

- New preference to address a performance issue with line wrapping a large number of lines in the console
  - *C/C++ - Build – Console – Maximum number of lines to enable word wrap for*
  - Don’t set this too high if *Wrap lines on the console* is turned on


Preferences

Console

☑ Always clear console before building

☑ Open console when building

☑ Bring console to top when building (if present)

☐ Wrap lines on the console

Limit console output (number of lines): 500

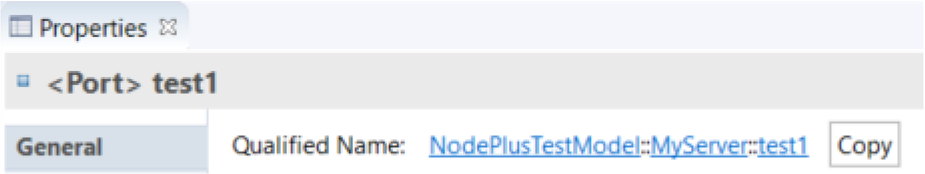
Delay updated between console updates (milliseconds): 75

Maximum number of lines to enable word wrap for: 5000

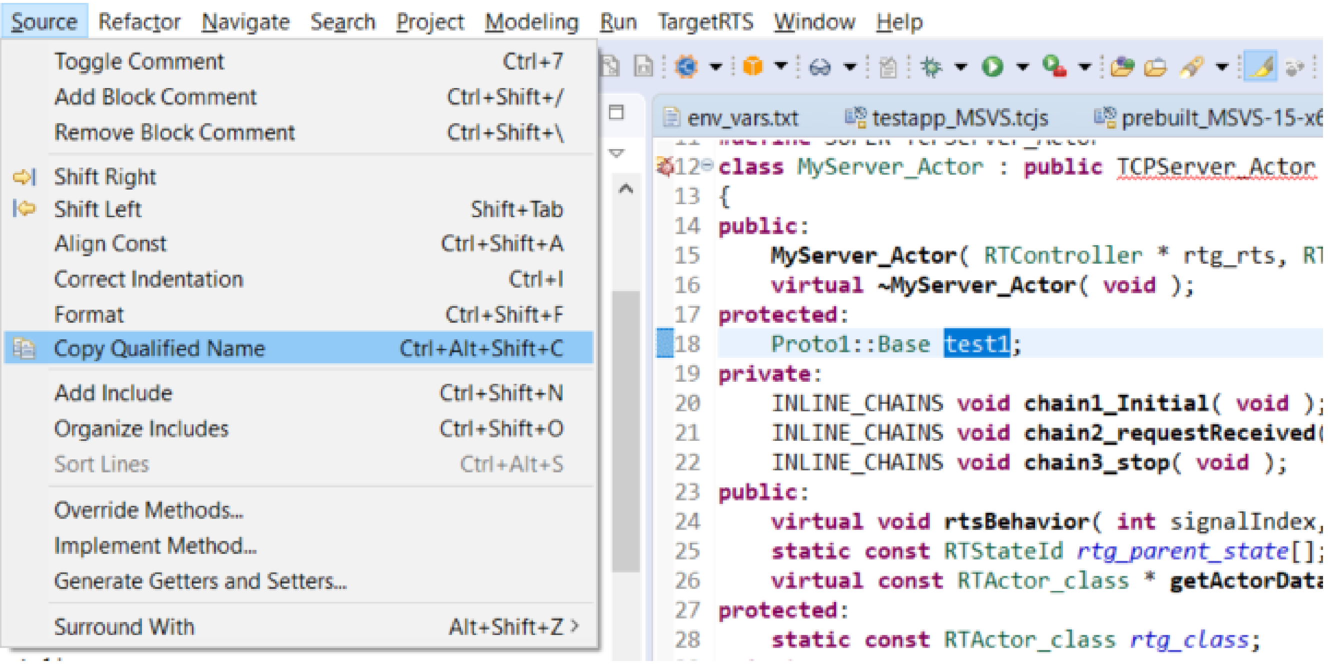
CDT 9.8 (included as part of Eclipse 2019.06)

- Improved dialog for attaching to a C++ application to debug
  - Command-line arguments for the process are now shown (allows to more easily find the process to debug)
  - The dialog now remembers a previously entered filter expression (to make it easier to attach to the same process multiple times)

- Copy the qualified name of a C++ declaration
  - A new command is available in the Source menu
  - Similar usecase as for the Copy button of the Qualified Name for a model element in the Properties view



Qualified Name: NodePlusTestModel::MyServer::test1



```
class MyServer_Actor : public TCPServer_Actor
{
public:
    MyServer_Actor( RTController * rtg_rts, RT
    virtual ~MyServer_Actor( void );
protected:
    Proto1::Base test1;
private:
    INLINE_CHAINS void chain1_Initial( void );
    INLINE_CHAINS void chain2_requestReceived(
    INLINE_CHAINS void chain3_stop( void );
public:
    virtual void rtsBehavior( int signalIndex,
    static const RTStateId rtg_parent_state[];
    virtual const RTActor_class * getActorData
protected:
    static const RTActor_class rtg_class;
```

CDT 9.8 (included as part of Eclipse 2019.06)

- CODAN improvements
  - Additional checks implemented, for example to detect C-style casts and goto-statements

- For more information about CDT improvements see
  https://wiki.eclipse.org/CDT/User/NewIn96
  https://wiki.eclipse.org/CDT/User/NewIn97
  https://wiki.eclipse.org/CDT/User/NewIn98

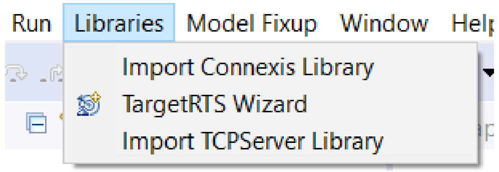
Newer EGit Version in the EGit Integration

- The EGit integration in RTist has upgraded EGit from 5.0 to 5.4
  - This is the recommended and latest version for Eclipse 2019.06

- This upgrade provides several new features, performance improvements and bug fixes
  - For detailed information about the changes see
    https://wiki.eclipse.org/EGit/New_and_Noteworthy/5.1
    https://wiki.eclipse.org/EGit/New_and_Noteworthy/5.2
    https://wiki.eclipse.org/EGit/New_and_Noteworthy/5.3
    https://wiki.eclipse.org/EGit/New_and_Noteworthy/5.4

Libraries Menu

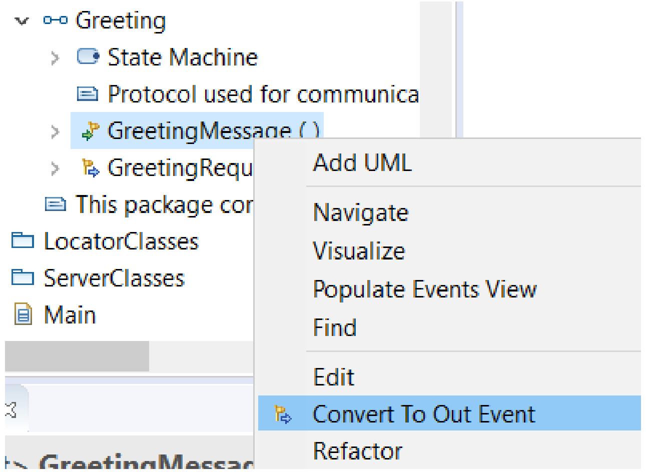
- A new menu in the menu bar with a few useful commands related to libraries
  - Contains the command for launching the TargetRTS wizard (i.e. the menu replaces the TargetRTS menu)



- Commands for importing the Connexis and TCPServer libraries
  - Available if these features have been installed
  - They import the Connexis or TCPServer library projects from the installation into the workspace

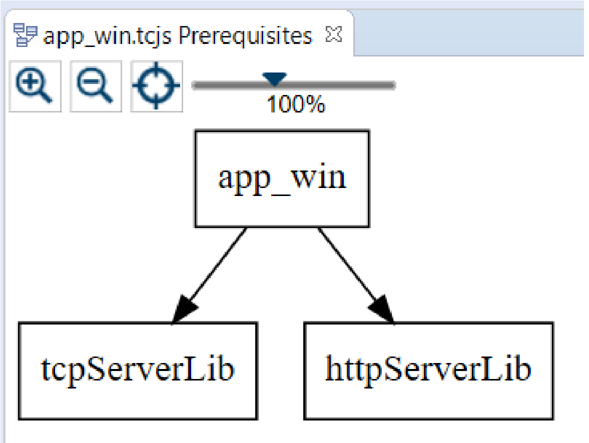
Converting Between In Events and Out Events

- It’s now possible to convert an In Event to an Out Event or an Out Event to an In Event
  - This can be useful for example if you want to change the conjugation of a port, and need to swap the direction of all events in the protocol of the port
- Use the new “Convert” command in the Project Explorer context menu of a protocol event



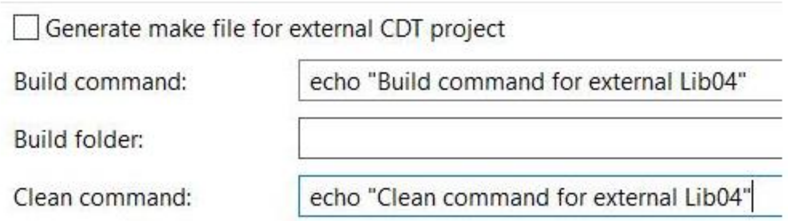
Graphic Visualization of TC Prerequisites

- The possibility to visualize TC prerequisites that was available in 10.2 for TCs in the old file format, is now also supported for TCs in the new .tcjs file format
  - A new command **Visualize – Explore in Browse Diagram** is available in the Project Explorer context menu of a TC
- The visualization uses Graphviz as an external tool for doing the graph layout
  - Graphviz must be separately installed.
    Specify the path to its "dot" utility in *Preferences – RealTime Development - Visualization*
- The graph is rendered using SVG in an embedded web browser
  - Support for panning and zooming
  - You can search for texts in the rendered diagram using Ctrl+F
- You can double-click on TCs in the graph to open the TC in the TC editor
- This is currently an experimental feature



Cleaning TCs

- External Library TCs have a new ”Clean Command” property
  - Use for example ”make clean”, invoke a ”clean script” or something else
- When it has been specified it’s possible to use the Clean command also on external library TCs
  - Currently this only works when cleaning from the command-line (using the makefile generated by the model compiler)
- When build variants are used, the Clean dialog now shows the Build Variants user interface
  - Allows setting the build variant settings which may influence on the behavior of clean, and clean build

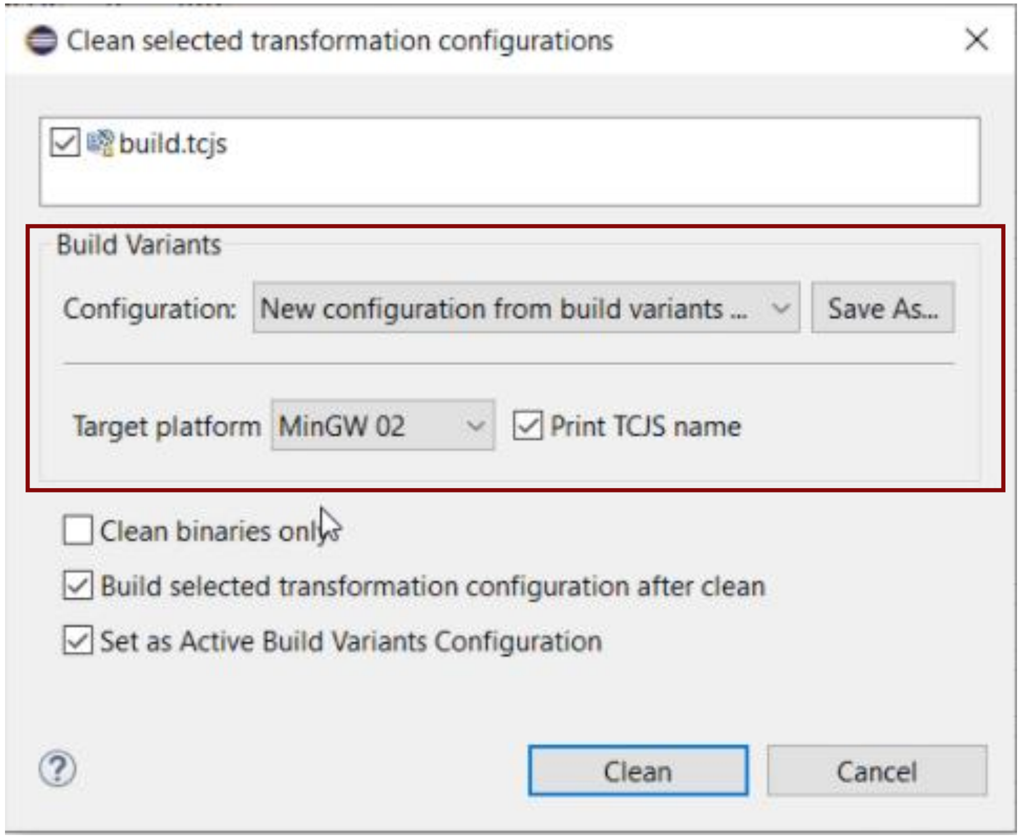


□ Generate make file for external CDT project

Build command: echo "Build command for external Lib04"

Build folder:

Clean command: echo "Clean command for external Lib04"



Clean selected transformation configurations

☑ build.tcjs

Build Variants

Configuration: New configuration from build variants ...

Target platform MinGW 02 ☑ Print TCJS name

□ Clean binaries only

☑ Build selected transformation configuration after clean

☑ Set as Active Build Variants Configuration

UML-RT Java APIs

- The Java APIs for creating UML-RT models programmatically have been extended
  - Creating a capsule part

```
RTCapsulePart RTCapsule.createCapsulePart(String name, RTCapsule type);
```

  - Setting the multiplicity of a capsule part, and its kind (fixed, optional or plugin)

```
void RTCapsulePart.setMultiplicityAndKind(int lower, int upper, AggregationKind kind);
```

  - Creating a connector between two ports on capsule parts

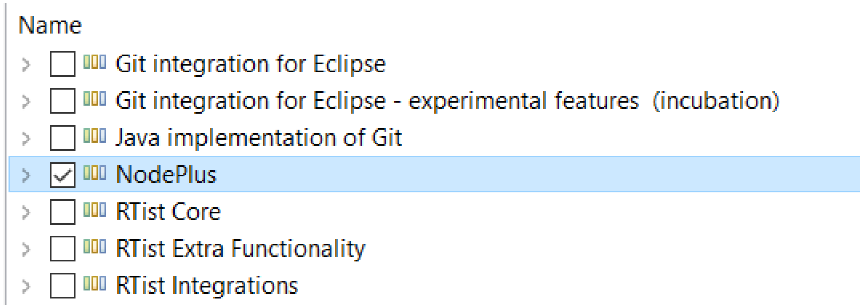
```
Connector RTModelOperations.createConnector(RTCapsulePart sourcePart,
RTPortRedefinition sourcePort, RTCapsulePart targetPart, RTPortRedefinition
targetPort) throws ConnectionError;
```

- The UML RT SDK sample has been updated to use these new APIs

NodePlus

- HCL NodePlus is a new install component of HCL RTist
  - Note: Currently NodePlus is not available in IBM RSARTE

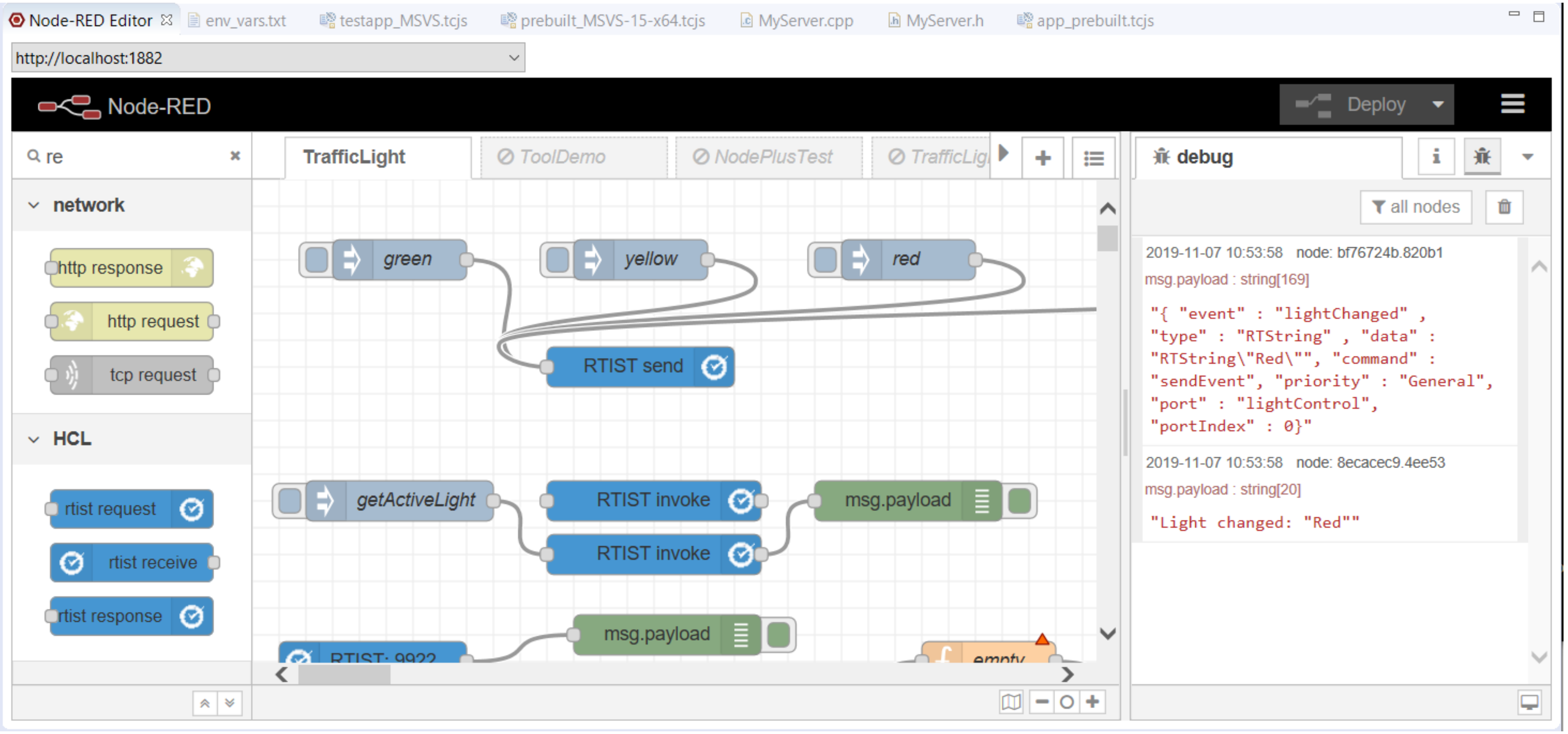
- NodePlus provides all necessary tooling for developing IoT applications using Node-RED (and related technologies)
  - Node-RED projects - both for creating Node-RED nodes and flows of interconnected nodes
  - Node-RED server - for convenient deployment of Node-RED flows within the Eclipse workbench
  - Node.js projects - for creating Node.js applications
  - Node.js server - for convenient deployment of Node.js applications within the Eclipse workbench
  - Swagger - for specifying APIs using Swagger documents
  - Node.js Debugger - for debugging Node.js applications
  - Pug (formerly known as Jade) – for template-based rendering of web pages
  - Unit test



Name
- □ Git integration for Eclipse
- □ Git integration for Eclipse - experimental features (incubation)
- □ Java implementation of Git
- ☑ NodePlus
- □ RTist Core
- □ RTist Extra Functionality
- □ RTist Integrations

Node-RED Tools in NodePlus

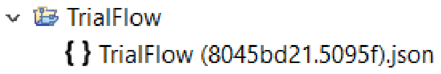
- Node-RED editor
  - Configure nodes and wire them together into flows
  - Deploy changes to the Node-RED server
  - View debug output and execution within the flow
  - Install new nodes to the palette (e.g. from the public library)



```
2019-11-07 10:53:58   node: bf76724b.820b1
msg.payload : string[169]
"{ "event" : "lightChanged" ,
"type" : "RTString" , "data" :
"RTString\"Red\"", "command" :
"sendEvent", "priority" : "General",
"port" : "lightControl",
"portIndex" : 0}"
2019-11-07 10:53:58   node: 8ecacec9.4ee53
msg.payload : string[20]
"Light changed: "Red""
```

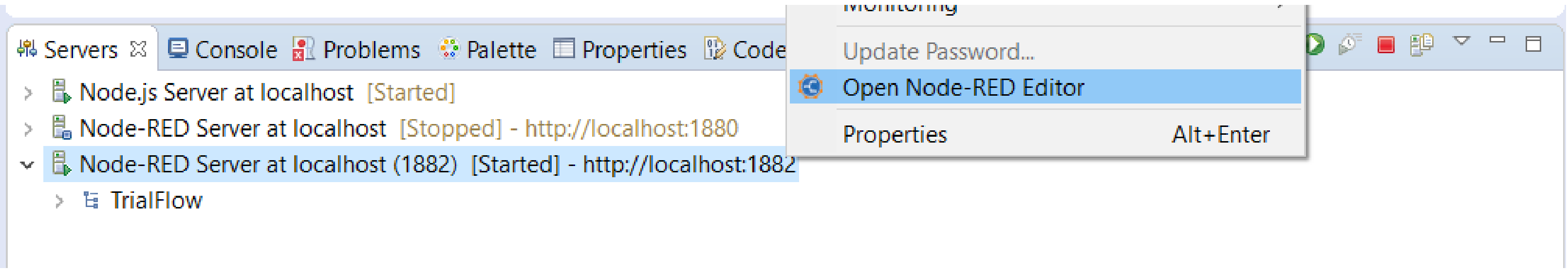
Node-RED Tools in NodePlus

- Node-RED Flow Projects
  - Flows can be created directly in the Node-RED editor, but creating them as Eclipse projects has many benefits (e.g. team development using SCM integration)
  - An intuitive wizard for creating Node-RED Flow projects
  - Either create a flow from scratch or start from one of the existing flows in the public library



TrialFlow
{ } TrialFlow (8045bd21.5095f).json

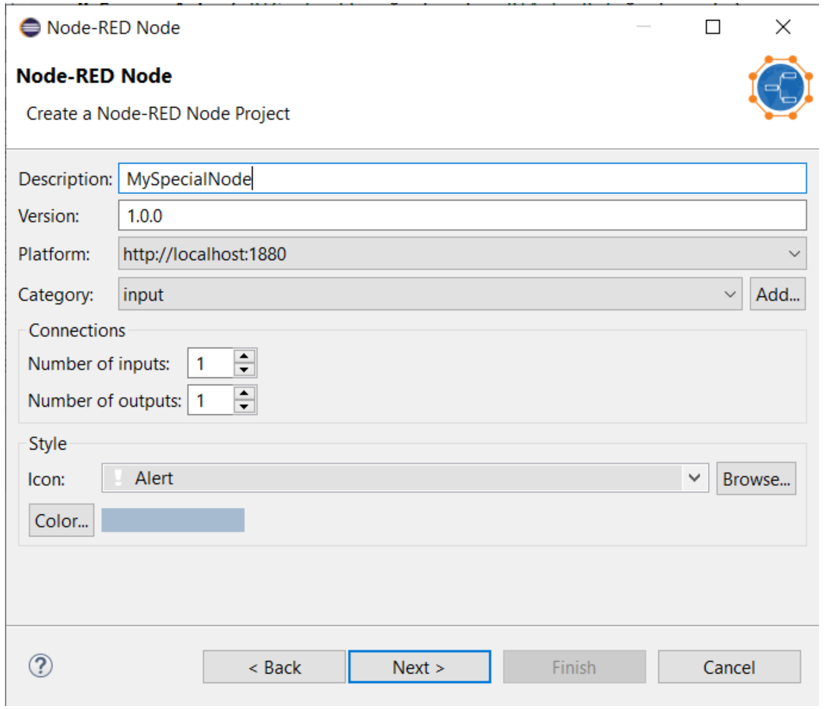
- Node-RED Server
  - A dedicated Servers view lets you create, start and stop Node-RED servers within the Eclipse workbench
  - Deploy a Node-RED flow onto a selected server and open its Node-RED editor



Node.js Server at localhost [Started]
Node-RED Server at localhost [Stopped] - http://localhost:1880
Node-RED Server at localhost (1882) [Started] - http://localhost:1882
TrialFlow

Node-RED Tools in NodePlus

- Node-RED Node Projects
  - More than 2500 nodes exist in the public library, but sometimes you may need to create you own specific node
  - An intuitive wizard for creating Node-RED Node projects
  - Benefit from all the usual Eclipse features when developing your node (e.g. SCM integration)
  - Either create a node from scratch or start from one of the existing nodes in the public library


Node-RED Node

Node-RED Node

Create a Node-RED Node Project

Description: MySpecialNode

Version: 1.0.0

Platform: http://localhost:1880

Category: input

Connections

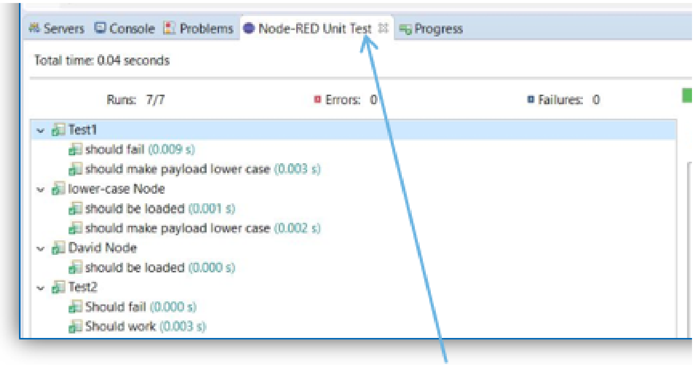
Number of inputs: 1

Number of outputs: 1

Style

Icon: Alert

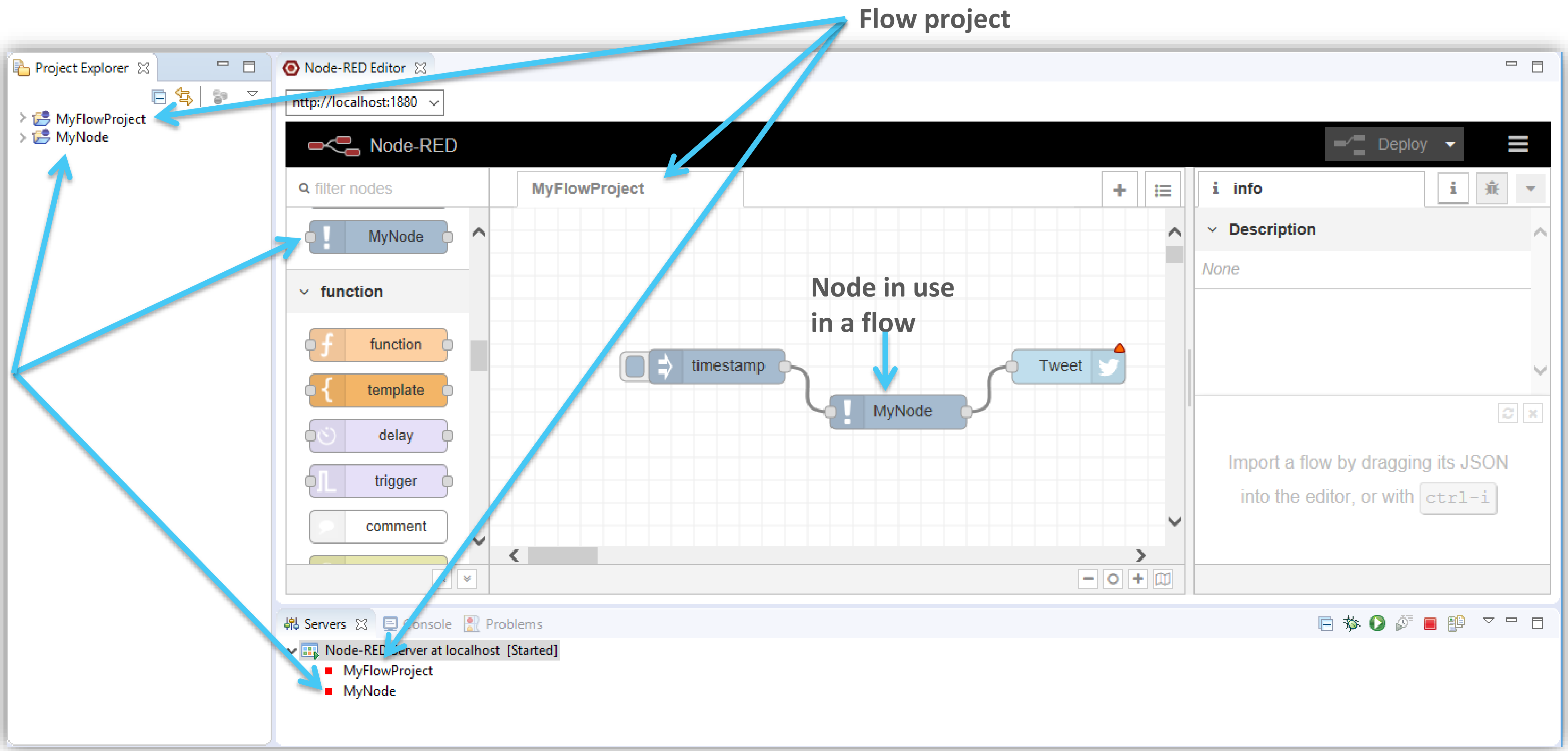
- Unit test of Node-RED nodes
  - Unit tests are created using the Mocha framework and results are shown in a special Node-RED Unit Test view



```
Total time: 0.04 seconds

Runs: 7/7          Errors: 0          Failures: 0

Test1
    should fail (0.009 s)
    should make payload lower case (0.003 s)
lower-case Node
    should be loaded (0.001 s)
    should make payload lower case (0.002 s)
David Node
    should be loaded (0.000 s)
Test2
    Should fail (0.000 s)
    Should work (0.003 s)
```

Custom “Unit Test” view

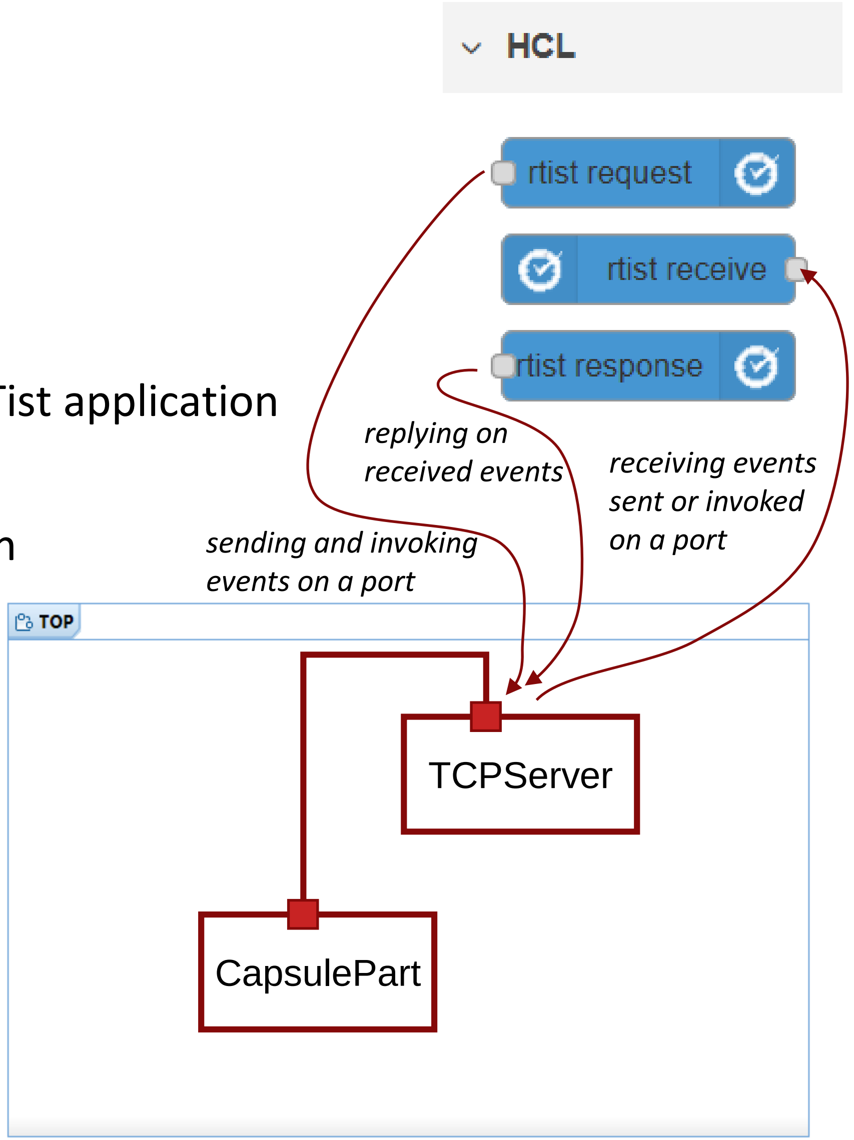
Node-RED Tools in NodePlus



HCL SOFTWARE

Node-RED Tools in NodePlus

- Nodes for communicating with an RTist application
  - **rtist request**
    Let a flow send or invoke an event into an RTist application
  - **rtist receive**
    Trigger a flow when receiving an event that is sent or invoked from an RTist application
  - **rtist response**
    Reply to a received event that is sent or invoked from an RTist application


HCL
rtist request
rtist receive
rtist response
replying on received events
receiving events sent or invoked on a port
sending and invoking events on a port
TOP
TCPServer
CapsulePart

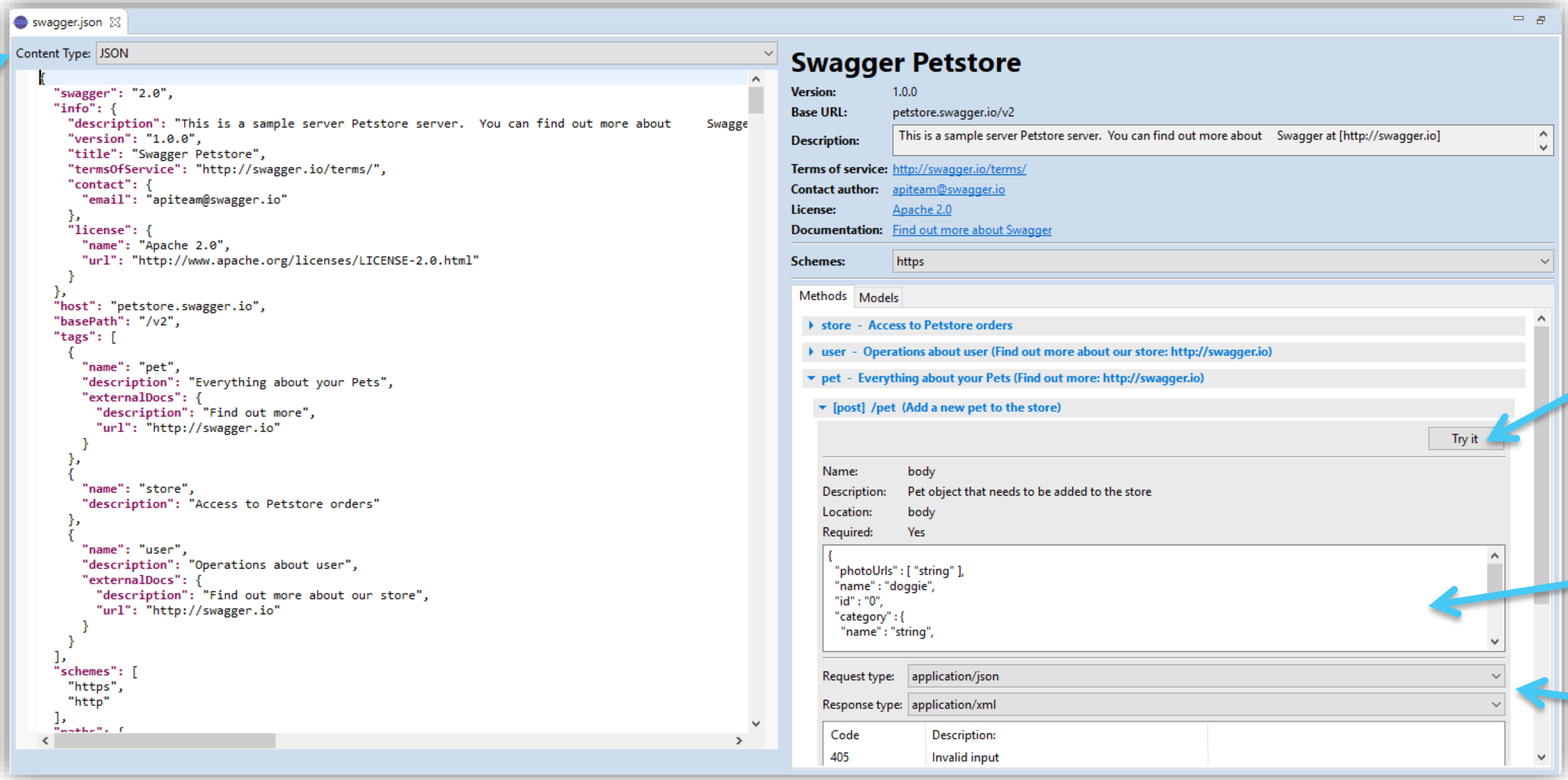
- These nodes make use of the JSON API provided by lib-tcp-server (i.e. the RTist application must use this library)
  - The nodes can be statically configured in the Node-RED editor
  - It's also possible to provide many of the node properties in the message payload for a more dynamic behavior

Swagger Support in NodePlus

- Document APIs using Swagger in a new Swagger editor

Support for JSON and YAML syntax

Syntax highlight and content assist



Content Type: JSON

```
{
  "swagger": "2.0",
  "info": {
    "description": "This is a sample server Petstore server.  You can find out more about     Swagge
    "version": "1.0.0",
    "title": "Swagger Petstore",
    "termsOfService": "http://swagger.io/terms/",
    "contact": {
      "email": "apiteam@swagger.io"
    },
    "license": {
      "name": "Apache 2.0",
      "url": "http://www.apache.org/licenses/LICENSE-2.0.html"
    }
  },
  "host": "petstore.swagger.io",
  "basePath": "/v2",
  "tags": [
    {
      "name": "pet",
      "description": "Everything about your Pets",
      "externalDocs": {
        "description": "Find out more",
        "url": "http://swagger.io"
      }
    },
    {
      "name": "store",
      "description": "Access to Petstore orders"
    },
    {
      "name": "user",
      "description": "Operations about user",
      "externalDocs": {
        "description": "Find out more about our store",
        "url": "http://swagger.io"
      }
    }
  ],
  "schemes": [
    "https",
    "http"
  ],
  "paths": {
```

Swagger Petstore

Version: 1.0.0

Base URL: petstore.swagger.io/v2

Description: This is a sample server Petstore server. You can find out more about   Swagger at [http://swagger.io]

Terms of service: http://swagger.io/terms/

Contact author: apiteam@swagger.io

License: Apache 2.0

Documentation: Find out more about Swagger

Schemes: https

- store - Access to Petstore orders
- user - Operations about user (Find out more about our store: http://swagger.io)
- pet - Everything about your Pets (Find out more: http://swagger.io)
  - [post] /pet (Add a new pet to the store)

Name: body

Description: Pet object that needs to be added to the store

Location: body

Required: Yes

```
{
 "photoUrls" : [ "string" ],
 "name" : "doggie",
 "id" : "0",
 "category" : {
  "name" : "string",
```

Request type: application/json

Response type: application/xml

Code	Description:
405	Invalid input

Visual API representation

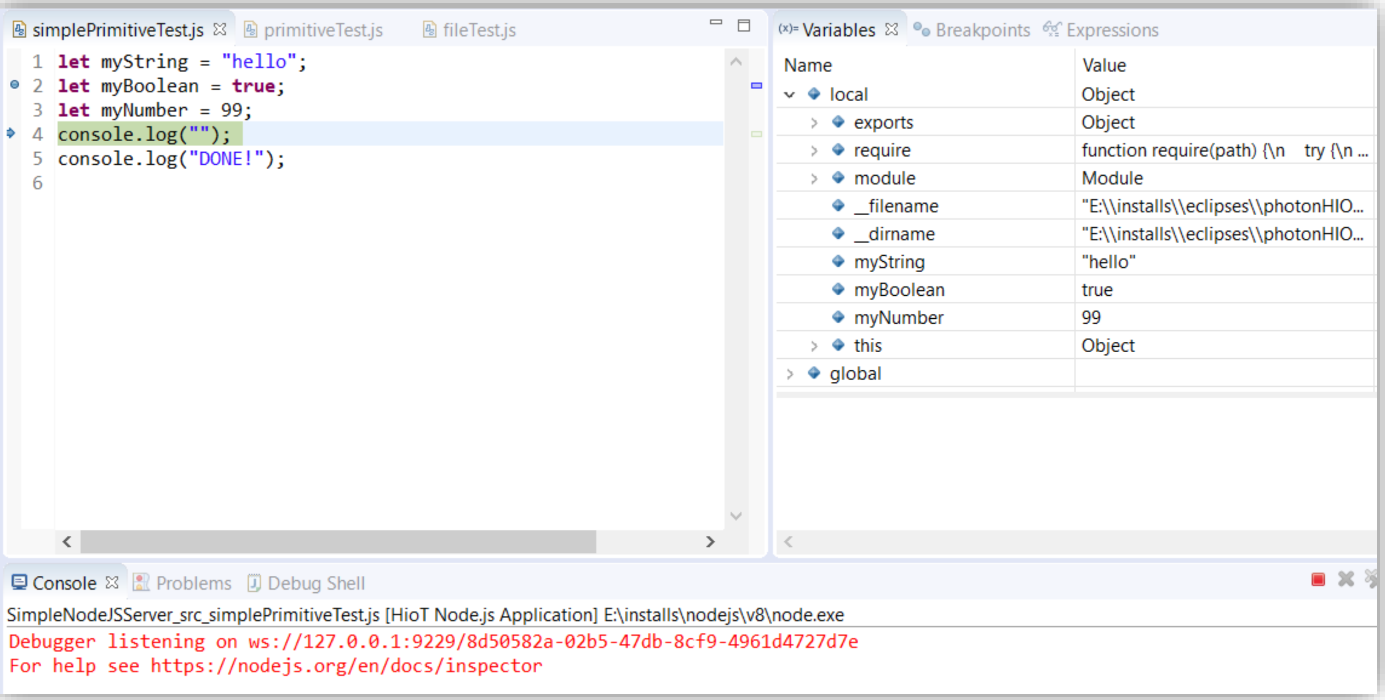
Support for executing / testing API

Automated generation of example data

Content types selections

Node.js Tools in NodePlus

- Wizard for creating Node.js projects
- Create, start and stop a Node.js server from within the Eclipse workbench
- Debug Node.js applications with a modern JavaScript debugger
- New editor for developing HTML pages for your Node.js application using the Pug template engine



```
let myString = "hello";
let myBoolean = true;
let myNumber = 99;
console.log("");
console.log("DONE!");

```

Name	Value
local	Object
exports	Object
require	function require(path) {\n try {\n ...
module	Module
__filename	"E:\\installs\\eclipses\\photonHIO...
__dirname	"E:\\installs\\eclipses\\photonHIO...
myString	"hello"
myBoolean	true
myNumber	99
this	Object
global	

```
SimpleNodeJSServer_src_simplePrimitiveTest.js [HioT Node.js Application] E:\installs\nodejs\v8\node.exe
Debugger listening on ws://127.0.0.1:9229/8d50582a-02b5-47db-8cf9-4961d4727d7e
For help see https://nodejs.org/en/docs/inspector
```

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