

Recent Enhancements of Node-RED for Rapid Development of Large Scale and Robust IoT Applications

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Agenda



- Introduction to Node-RED
 Flow-based Programming in Node-RED
- **3. Recent Features of Node-RED**







Introduction to Node-RED Flow-based Programming in Node-RED Recent Features of Node-RED



What is Node-RED?

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OSS Visual Programing Tool for IoT Applications Development
 Originally developed by IBM. Currently project under OpenJS Foundation
 Works on broad range of computers: Small IoT devices to Cloud Env.
 Rapid development of Applications by connecting set of predefined nodes



Growing Use of Node-RED



Node-RED users are growing continuously since its introduction:
Over 60K downloads/month in 2019
1.8M accumulated downloads in 2019



Major IT companies adopting Node-RED for their products/services



In HITACHI:

Use Node-RED in "DevOps for IoT" application development env. of Lumada Solution Hub*



"2 Hitachi's SAP HANA Cloud Service. Business Management Dashboard Service. "J Hitachi Blockchain Service for Hyperledger Fabric

*: <u>https://www.hitachi.com/New/cnews/month/2019/03/190318.html</u>

HITACHI's Contribution to Node-RED

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HITACHI started OSS activities on Node-RED in 2017 Added features to Node-RED and contributed them to community (over 51,000 lines of code)



Contributor's Ranking of GitHub: 5 from HITACHI in top 10

Contributions from HITACHI

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Introduction to Node-RED Flow-based Programming in Node-RED Recent Features of Node-RED



Programming in Node-RED

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Flow-based Visual Programing Tool for IoT Applications Development

Rapid development by simply connecting set of predefined nodes
 Over 2,100 nodes available: Web API, GUI, Data Mgmt./Proc., Edge, etc.



Flow-based Programming



Node-RED uses message based processing model



Programming Language	Node-RED
Control Flow	Message Flow
Data	Message
Variable	Message/Context
Statement	Node
Function	Node/SUBFLOW

Comparison of Concepts

Available Node-RED Nodes

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Over 2,100 nodes available: Web API, GUI, Data Mgmt./Proc., Edge, etc. Nodes are easily installable from Node-RED Editor



Node-RED Library



Node-RED Execution & Installation



Node-RED is web application working on both of cloud and edge side Easy to Install!



Installation: (Linux/MacOS/Windows)

```
## npm
sudo npm install -g nodered; nodered -p 1880
## docker
docker run -p 1880:1880 nodered/node-red-docker
```

DEMO: Weather Map of World Cities





Agenda



Introduction to Node-RED Flow-based Programming in Node-RED Recent Features of Node-RED



Productivity	Robustness
 SUBFLOW Enhancements+ UI Widgets*+/Layout Tool* Node Template Generation* 	 Testing Framework (Ul* & Flow[†]) Flow Validation (Lint)[†] Quality Improvements*
Functionality	Usability
Message Sequence Nodes+	Improved Node Representation+*

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Productivity	Robustness
SUBFLOW Enhancements Ul Widgets/Layout Tool Node Template Generation	 Testing Framework (UI & Flow) Flow Validation (Lint) Quality Improvements
Functionality	Usability
 Message Sequence Nodes Persistable Context 	Improved Node Representation Internationalization
Dashboard Extension API	Documentation

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Productivity	Robustness
SUBFLOW Enhancements Ul Widgets/Layout Tool Node Template Generation	 Testing Framework (UI & Flow) Flow Validation (Lint) Quality Improvements
Functionality	Usability
 Message Sequence Nodes Persistable Context Dashboard Extension API 	 Improved Node Representation Internationalization Documentation

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Node-RED is a highly effective tool for rapid creation of new solutions.
 On the other hand, we want to create basis for sharing common solution patterns useful for creating new custom solutions by novice IT users



Abstraction with current FLOW, SUBFLOW or Node is not sufficient
 Needs a way to ease creation and customization of solutions

	Creation	Customization
FLOW	easy (visual editor)	difficult (no specific customization point)
SUBFLOW	easy (visual editor)	difficult (no specific customization point)
Node	difficult (HTML+JS)	easy (node settings UI)



By adding customization capability to SUBFLOW, SUBFLOW can define similar functionality to existing nodes using Node-RED editor GUI

ltem	Node	SUBFLOW (ToBe)	
Logic	JavaScript	Flow (via GUI)	
Info Text (document)	HTML	None \rightarrow Markdown (via GUI)	
lcon	Any Picture	None \rightarrow Icon Font (via GUI)	
Category	Any Category	None \rightarrow Any Category (via GUI)	
Settings UI	HTML	None	
Color	Any Color	None	
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*: under development. will be included in 1.0 release~

Settings UI Definition for SUBFLOW



Developing Settings UI definition feature which allows GUI-based definition of SUBFLOW settings UI

Edit subflow template: replace		Edit subflow instance: replace
Cancel Done		Edit subflow template Delete Cancel Done
© Properties 🛛 🖉 🐨 🛒 👻		O Properties O 🕅 🕅
Name replace If SUBFLOW properties Preview UI		Name Sample3 Config
- Name	(# Pattern * ^a ₂ \B(?=(\d[3])+(?!\d))	(♂ Pattern ▼ ^a _z \B(?=(\d[3])+(?!\d))
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SUBFLOW UI Definition

Generated Input UI

Exporting SUBFLOW as Node

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Enhanced SUBFLOW feature ease creating & sharing common solution patterns by novice IT users



Productivity	Robustness
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Node-RED Dashboard

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 Node-RED provides capability to create simple GUI
 To meet wider range of requirements, we created following features: Plugin API for new UI widget, new UI widgets, and layout editor



Example UI Widget: Vega Node



Supports various kinds of data visualization described in JSON
 Naturally fits with JSON based message processing of Node-RED



Dashboard Layout Tool

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Creating complex GUI layout is cumbersome in current Node-RED
 Dashboard Layout Tool allow intuitive layout of dashboard GUI



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DEMO

Message from Node-RED Creators







Join Node-RED Community!

Node-RED: https://nodered.org
 Slack: <u>https://node-red.slack.com/</u>
 GitHub: <u>https://github.com/node-red</u>

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