

Flow-based programming: NodeRed

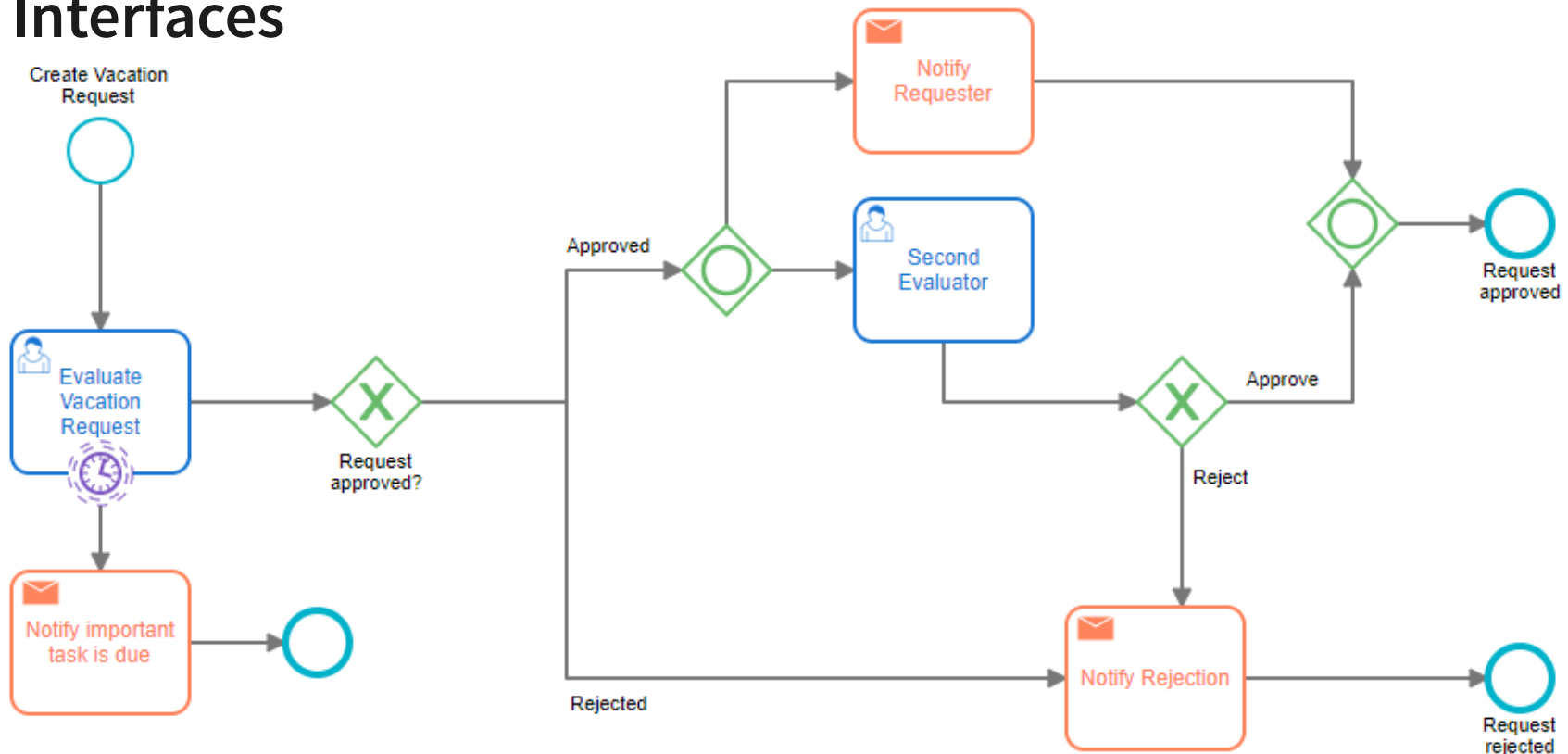


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Flow-based programming

No-code programming style:

- Connect functional modules
- Configure their properties
- Build User Interfaces



Node-RED (<http://nodered.org>)

Flow-based visual programming tool created initially by IBM for **IoT**

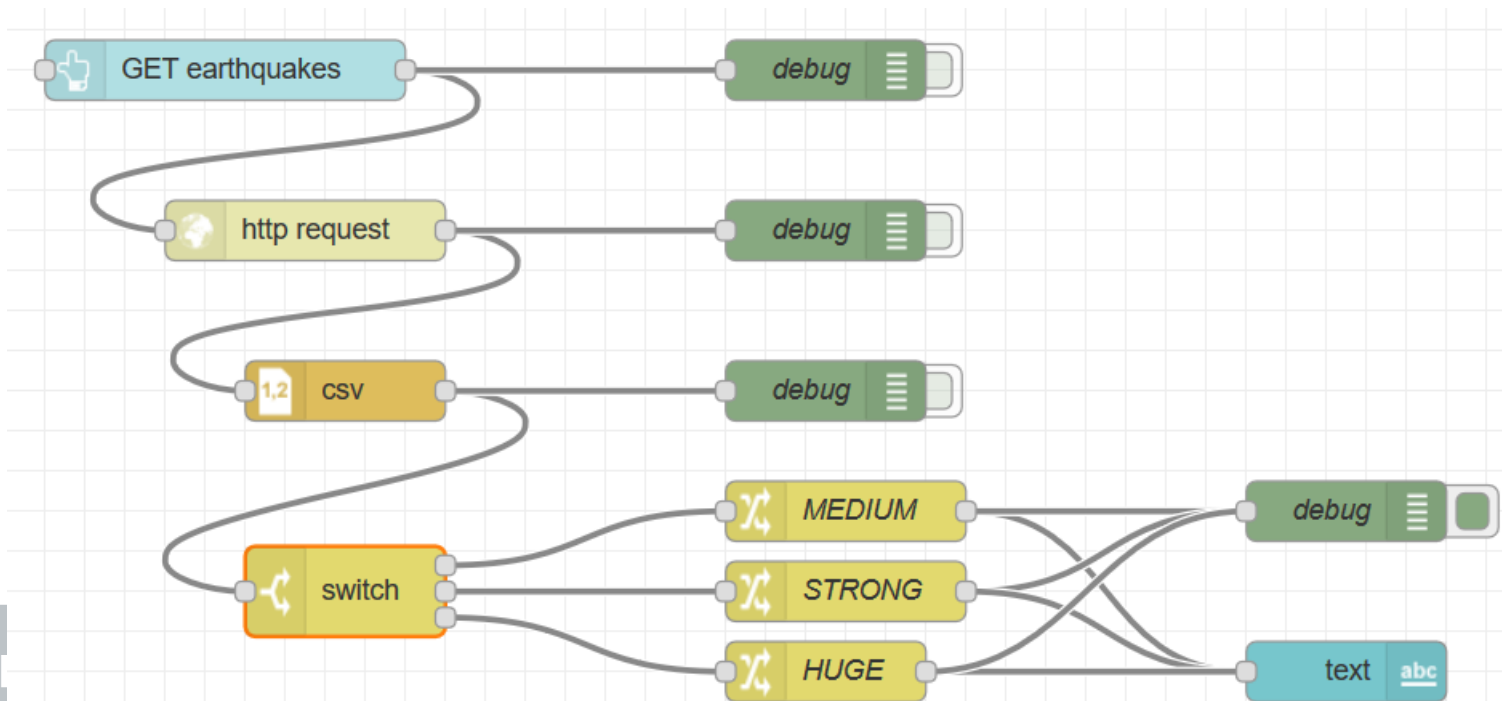
Interconnected **JavaScript** functional units (installed with NPM)

Wires communicate JSON **messages** aggregating all data

- functional units get/add data to the messages
- messages can be split/joined into message sequences

Inherently
parallel

A node could
contain full
programs



Terminology

- Flow:** a graph of interconnected nodes
- Node:** a functional unit (JavaScript program)
- Wire:** a bus interconnecting two nodes
- Subflow:** a node containing a flow (==> hierarchical flows)
- Group:** a grouped set of nodes with label (documentation)

Features

Typed wires?	NO	(messages/dictionaries)
Functions?	YES	(in JavaScript, inside a node)
Functional programming?	NO	(just stream processing)
Recursion?	YES	(in Javascript, inside a node)
Loops?	YES	(in Javascript or with a node)
External languages?	NO?	
File I/O	YES?	(in Javascript, inside a node)
Modularization?	YES	(Subflows)
Concurrency?	YES	

Programming style

Low level programming is done in JavaScript

Flows: higher level programming (organization, data exchange)

Good to blend many already available nodes + some personalized

Data exchange style: blackboard messages

- every node can read/write/modify messages from the stream
- many “blackboards” if there are many paths

Some synchronization pattern is slightly cumbersome?

- waiting for K data on the stream
- ...

A huge palette of available Flows/Nodes

<https://flows.nodered.org>

Microcontrollers:

- Raspberry Pi
- Arduino

Applications:

- Mysql/... databases
- Excel/... spreadsheets

Application fields

- IoT
- AI
- Crypto
- ...

Home automation:

- Alexa
- Google Home
- Tuya smart
- Home appliances
- Fritz!Box routers
- Printers
- Vacuum (Roomba ...)
- Washers (Miele ...)
- ...

> common

> function

> network

> input

> output

> sequence

> parser

> storage

> Raspberry Pi

> Model Asset
eXchange

> formats

> movehub

> dashboard

> IBM Watson

EXAMPLES