

Towards a Distributed and

Self-Adaptable Cloud-Edge Middleware

SEC 2018, Bellevue, WA, USA

Julien Gascon-Samson, Kumseok Jung and Karthik Pattabiraman

Department of Electrical and Computer Engineering, University of British Columbia, Canada

Thingsis: a self-adaptive cloud-edge middleware for designing and running high-level, complex JavaScript applications on the IoT devices themselves.

Motivational Example: Motion Detection for Videosurveillance in the edge







ThingsJS: A Cloud-Edge Framework

ThingsJS Application: Contains Several Components (Motion Detection example)



ThingsJS: A Self-Adaptive Runtime







ThingsJS: User Interfaces (Web Dashboard + CLI)

| ece ThingsJS | | API Docs 🕥 Github | ThingsJS | | | API Docs O Github | ece ThingsJS | | | | | API Docs O Github |
|----------------------------|--------------------------------------------------------|----------------------------------------------------------------------|----------------------------|----------------------------------------|---------------------------------------------------------------------|--------------------------|----------------------------|------------------------------------------------|--------------------------------------------------------|-------------------------|-----------------|--------------------------|
| Nodes | Nodes | pi3-01 • Status Graph Console | Nodes | Available Code | Selected Components | Clear All | Nodes | jmuZyaoc • Workflow Gra | ph Console Output | Components | | |
| Components Applications | pi3-01 | 100 % | Components Applications | factorial.js select | factorial.js num_instances: required_memory: | remove | Components Applications | Program Run time ID:jmuZyaoc | | Q Search Components | | |
| Schedules | pi3-02 | 50 % | Schedules | video-streamer.js select | motion-detector.js num_instances: required_memory: Name: New App Co | emory: | Schedules | Code Name video-streamer.js*1 | Status Running | Code Name 🕶 | Runtime S ID | atus Running Device |
| Files | E3 xeon-01 | 0 % 10:35:58 10:36:20 10:36:40 10:36:58 | Files | | | | Files | PROGRAM HISTORY show • lines | motion- detector.js*1 | lfynBgmF F | unning pi3-02 | |
| | | Select Code V Run | being | | | | being | DeviceStart Timexeon-01Aug 9, 2018 10:34:38 AM | End time Status on device "Fake" Running | video- streamer.js*1 | jmuZyaoc F | unning xeon-01 |
| | Raw Motion Video Stream Motion | xeon-01 v Status Graph Console CPU Memory | | | Application Prototype | | | IfynBgmF • Workflow Gra | Graph Console Output | | | |
| | | | | My App Detailed Components Gener | | remove | | 400.0% | m CPU Memory | | | |
| | 35 MB | | | Video Surveillance Detailed Components | Generate&Start | remove | | 100 % 50 % | | | | |
| | | 34.44 MB 10:35:57 10:36:20 10:36:40 10:36:57 | | | | | 0% | | | | | |
| | | Select Code V Nun | | | | - | | 10:40:43 10:41:00 10:41:20 | 10:41:40 10:42:00 10:42:21 | | | |

Applications & Use Cases

thingsjs.io

Edge Stream Processing & Machine Learning



Regulation in Smart Buildings / Smart Homes

Publications:

• Gascon-Samson J., Jung K., Pattabiraman K. Poster: Towards a Distributed and Self-Adaptable Cloud-Edge





For more info and how to get involved:

DependableSystemsLab/ ThingsJS



Middleware, SEC 2018

• Jung K., Gascon-Samson J., Pattabiraman K. Demo: ThingsMigrate - Platform-Independent Live-Migration of JavaScript Processes, SEC 2018 • Gascon-Samson, J., Jung, K., Goyal, S., Rezaiean-Asel, A., Pattabiraman, K. ThingsMigrate: Platform-Independent Migration of Stateful JavaScript IoT Applications, ECOOP 2018

• Gascon-Samson, J., Rafiuzzaman M., Pattabiraman K. ThingsJS: Towards a Flexible and Self-Adaptable Middleware for Dynamic and Heterogeneous IoT Environments, *Middleware for IoT (m4iot)@Middleware* 2017

• Gascon-Samson, J., Rafiuzzaman M., Pattabiraman K. SmartJS: Dynamic and Self-Adaptable Runtime Middleware for Next-Generation IoT Systems (Poster), SPLASH 2017, Vancouver, Canada