Scriptable Sensor Network

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Outline

- Project Background
- Basic Idea
- Application Architecture

Problem

- We never know what applications we need in the future
- Therefore, we should be able to deploy new applications dynamically

Solution

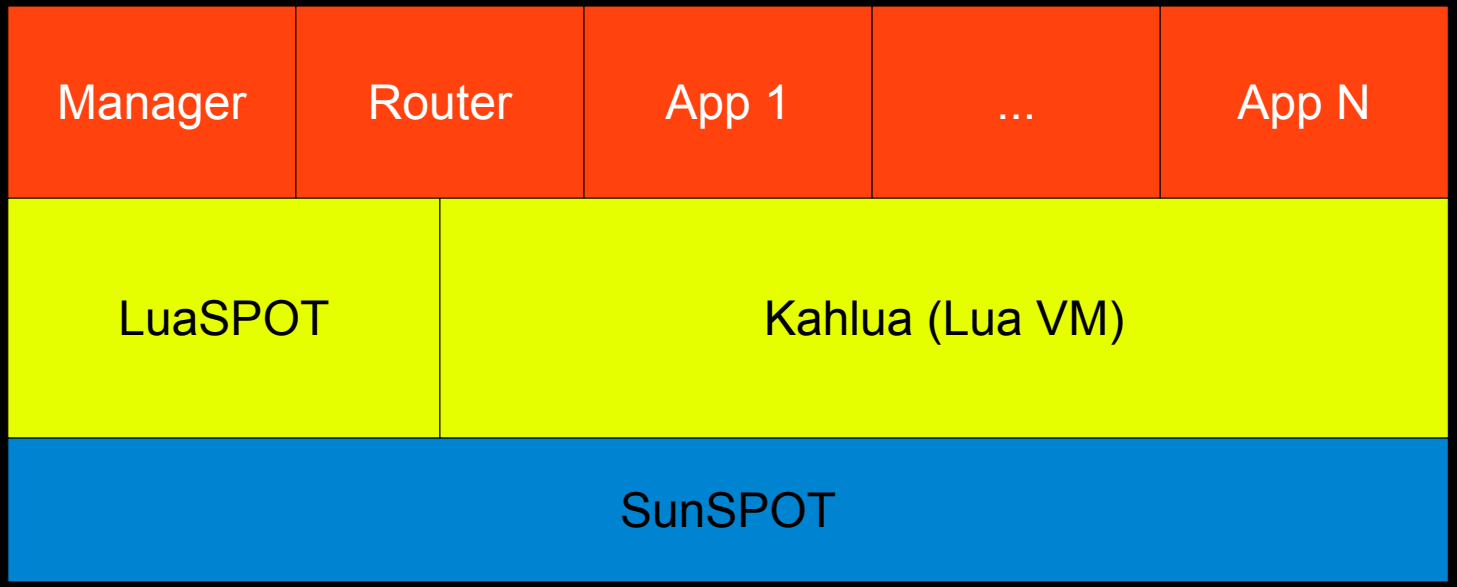
- Run a virtual machine on the sensor network
- Run scripts on it
- Provide a way to install and run the script dynamically

Lua SPOT

- Script execution environment on Sun SPOT
- Uses Lua script
- Lua is a powerful, fast, lightweight, embeddable scripting language*

*) http://www.lua.org/about.html

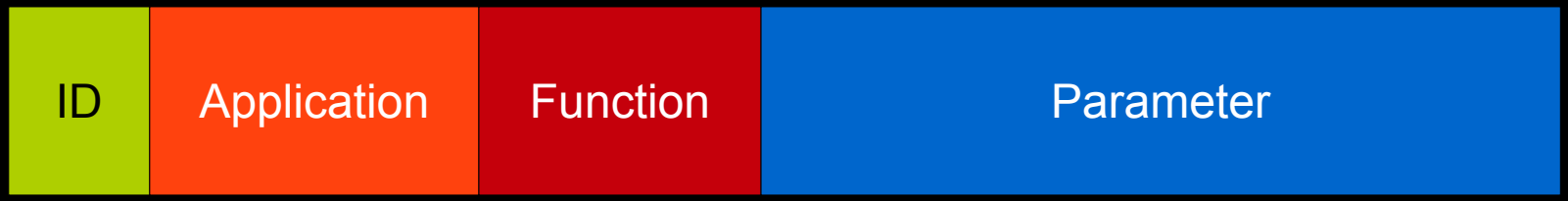
Architecture



Kahlua: http://code.google.com/p/kahlua/

Service Provider

- Sensor network as a service provider
- Application provides services
- Function invocation => RPC



- Bootstrapped by dispatch() function

dispatch(message)

- Create new Lua VM for each invocation
- Select correct application
- Invoke the requested function
- Lua VM is destroyed after the function returns
- Each execution is stateless and isolated
- Persistent memory storage and synchronization are provided

Lua API

- SunSpotLib
  - Access SunSPOT functions: sensors, leds, sleep, ...
- LuaSpotLib
  - Persistent memory, synchronization, send(), dispatch(), ...

Application Manager

- Implemented in Java
- Install and remove application
- Install function accepts fragmented data

Router

- Implemented as a Lua Application
- Contains nested message that will be `dispatch()`-ed

Limitation

- Memory handling
- Message checksum
- Need better routing algorithm

Future Works

- Implement Sun SPOT APIs completely
- Lua SPOT SDK and simulator
- Asynchronous `dispatch()`
- More efficient message format

Demo

- Ping, topology, function invocation, ...
- Create path based on a certain data
- Turn on the LEDs along the path

Q/A