Flow-based programming for heterogeneous systems

with NoFlo and MicroFlo

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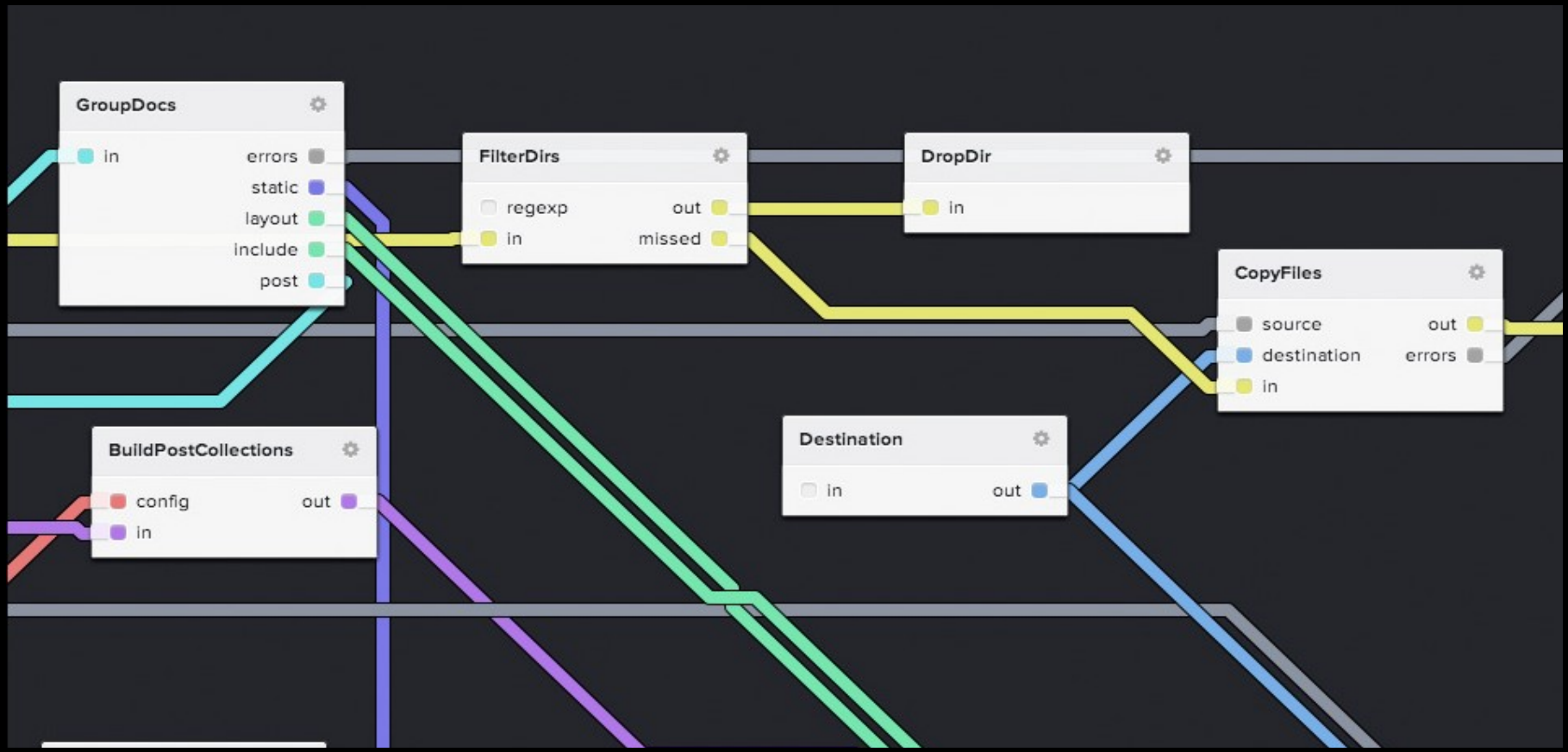
FBP 101



No source code generation!

FBP: Not just visual programming

```
# Thermostat
timer(Timer) OUT -> TRIGGER thermometer(ReadDallasTemperature)
thermometer() OUT -> IN hysteresis(HysteresisLatch)

# On/Off switch
hysteresis() OUT -> IN switch(BreakBeforeMake)
switch() OUT1 -> IN ia(InvertBoolean) OUT -> IN turnOn(DigitalWrite)
switch() OUT2 -> IN ic(InvertBoolean) OUT -> IN turnOff(DigitalWrite)
# Feedback cycle to switch required for syncronizing break-before-make logi
turnOn() OUT -> IN ib(InvertBoolean) OUT -> MONITOR1 switch()
turnOff() OUT -> IN id(InvertBoolean) OUT -> MONITOR2 switch()

# Config
'5000' -> INTERVAL timer() # milliseconds
'4' -> LOWTHRESHOLD hysteresis() # Celcius
'5' -> HIGHTHRESHOLD hysteresis() # Celcius
'["0x28", "0xAF", "0x1C", "0xB2", "0x04", "0x00", "0x00", "0x33"]' -> ADDRE
thermometer()
board(ArduinoUno) PIN9 -> PIN thermometer()
board() PIN12 -> PIN turnOff()
```

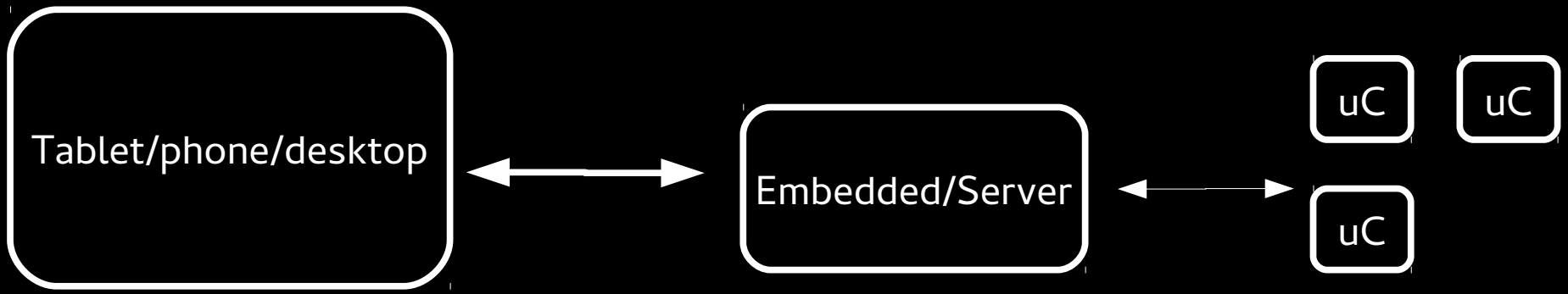
+ Both NoFlo and MicroFlo have embedding APIs

Case: Heating system

User Interface

Data aggregation/analysis

Sense & actuate



Fluent
Many platforms
BYOD

JavaScript+HTML
ObjC,Java,C#

Secure

Python/Lua/Ruby
+++

Realtime

C/C++

Next

- Finishing MicroFlo graphs as NoFlo components
- More dynamic component registration
  Subgraph editing UI
- Node.js graphs as components in browser
- FBP runtimes as peers, not just components
- Specialized domains/runtimes
- Proper case studies!

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flowhub.io

noflojs.org, @noflo

microflo.org

Jon Nordby, jonnor.com, @jononor

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Testing & verification

Device freedom

Visual programming

Audio/graphics processing

FPGA

GPGPU

Sensorblock

“universal“ reprogrammable sensor

uController + collection of common sensors

+ battery, wireless, storage

Arduino priced, weather-proofed, pocket-size

Open hardware, fablab/hackerspace friendly

github.com/jonnor/sensorblock