



SmartJS: Automated Runtime System and Middleware for Next-Generation IoT Systems

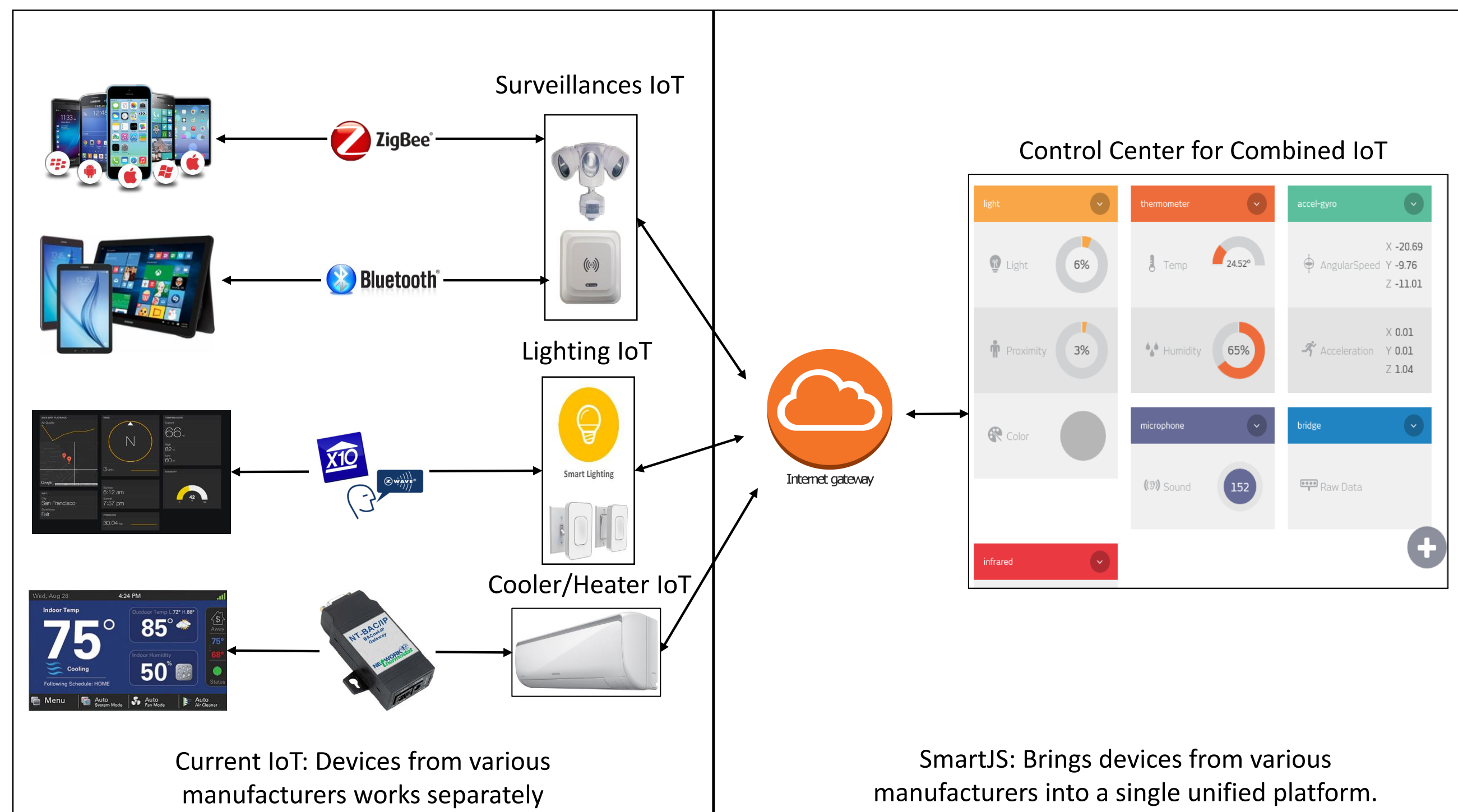


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Motivation

SmartJS: a rich Javascript-based self-adaptable runtime environment which features a **universal programming API**, a **comprehensive monitoring framework** and an **ubiquitous communication substrate** for engineering and developing **dependable, scalable, adaptable large-scale IoT systems**.

Traditional IoT vs SmartJS



Writing a SmartJS Application

```

1 // ...
2
3 // Connect
4 pubsub.connect(function() {
5
6 // Repeat every second
7 setInterval(function() {
8
9 // Read temperature from GPIO pin
10 var temperature = GPIO.readPin(12);
11
12 // Publish temperature
13 pubsub.publish("smartsensor/temperature", {
14 id: mySensorId,
15 temperature: temperature
16 });
17
18 }, 1000);
19
20 });

```

sensor.js

```

1 // ...
2
3 // Connect
4 pubsub.connect(function() {
5
6 // Subscribe to temperature messages
7 pubsub.subscribe("smartsensor/temperature", function(d) {
8
9 if (d.temperature > threshold) {
10 pubsub.publish("smartsensor/actuation", {
11 id: d.id,
12 powerVariation: -5
13 });
14 } else if (d.temperature < threshold) {
15 pubsub.publish("smartsensor/actuation", {
16 id: d.id,
17 powerVariation: 5
18 });
19 }
20
21 });
22 });

```

regulator.js

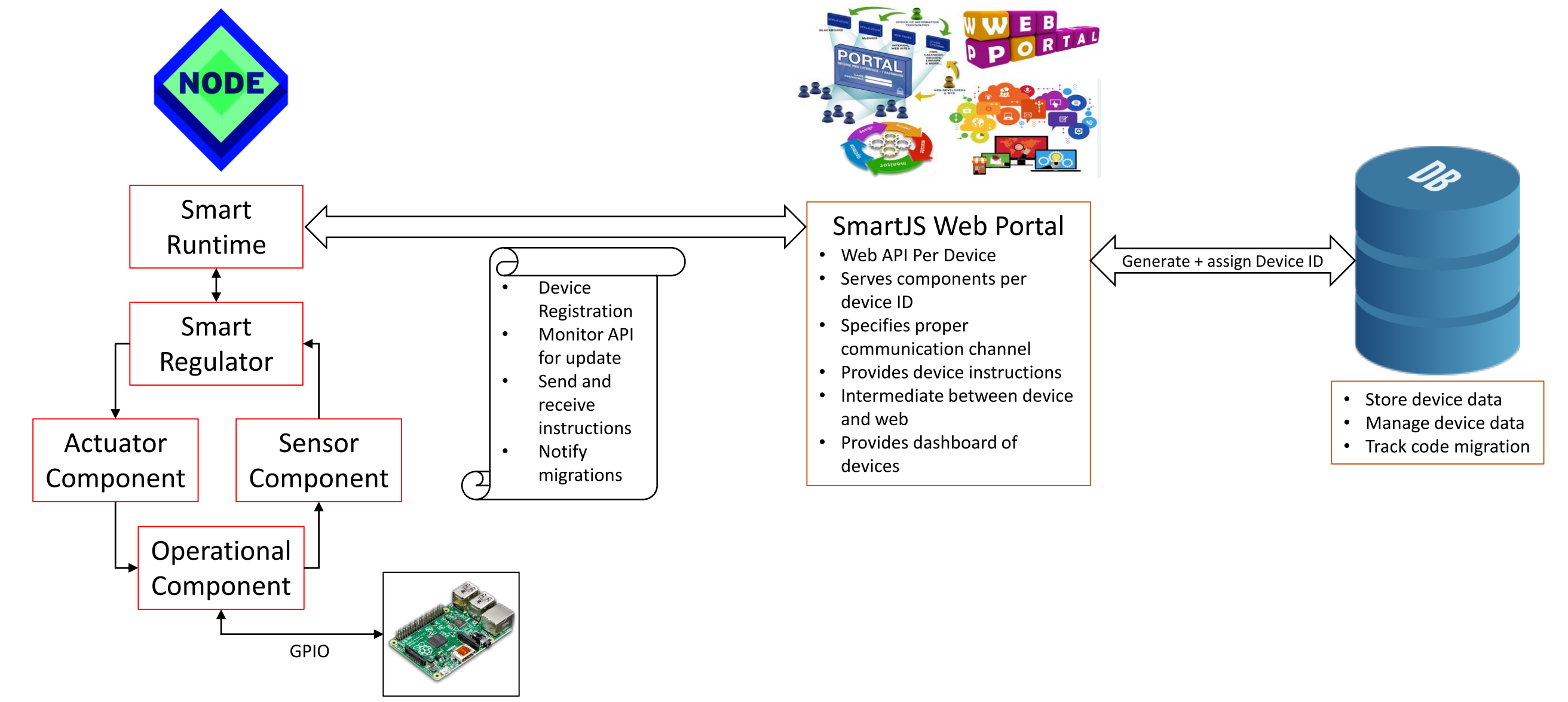
```

1 // ...
2
3 // Connect
4 pubsub.connect(function() {
5
6 // Subscribe to change power topic to receive commands
7 // from the manager
8 pubsub.subscribe("smartsensor/actuation", function(d) {
9
10 // Adjust the power by writing to GPIO pin
11 GPIO.writePin(14, d.powerVariation);
12
13 });
14
15 });

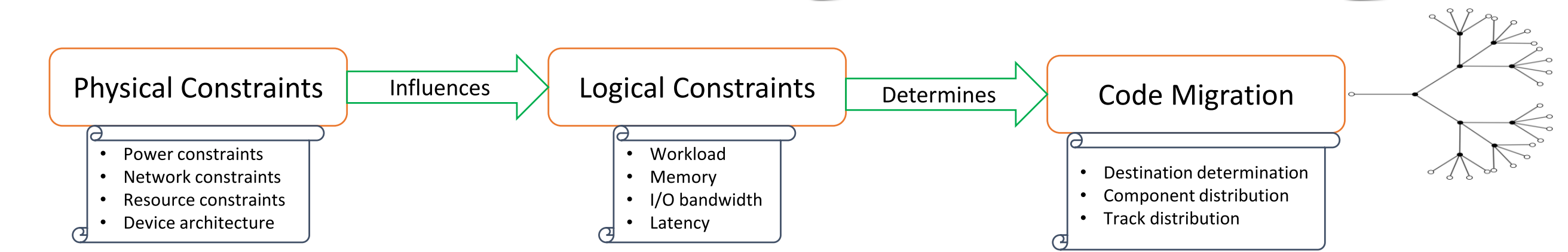
```

actuator.js

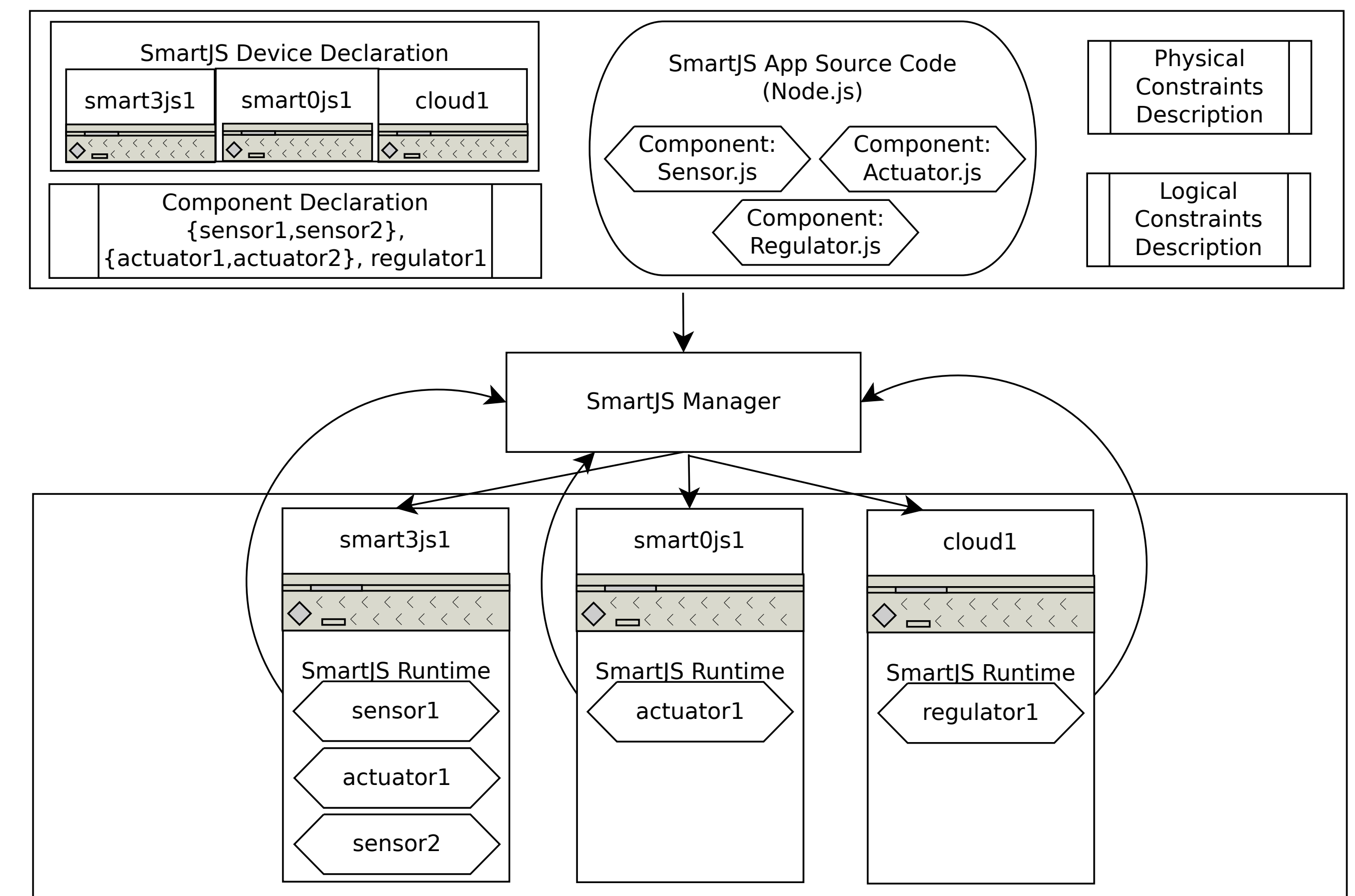
SmartJS Ecosystem



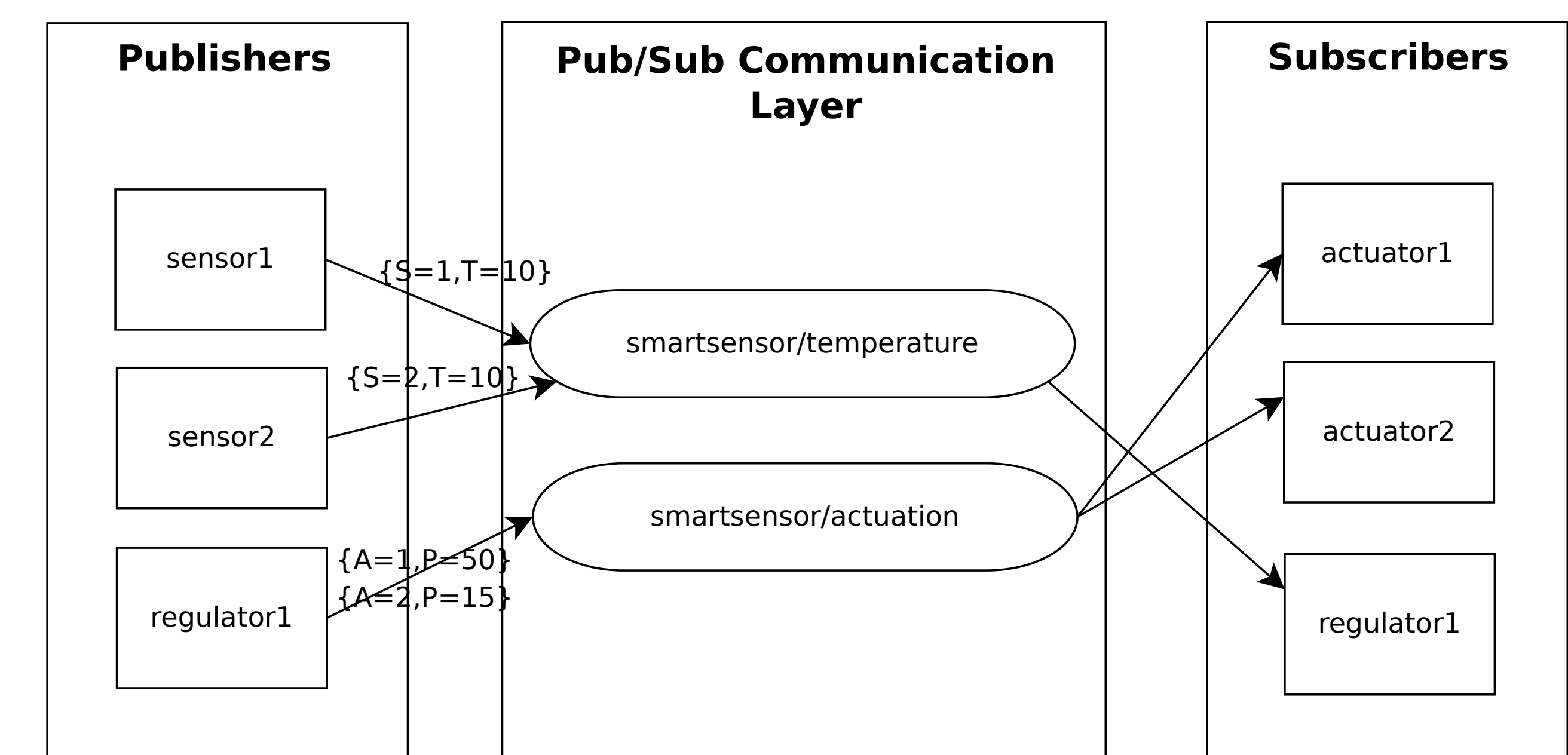
Constraints Hierarchy and Code Migration



System Architecture



Publish-Subscribe Paradigm



Researchers

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