Liquefy the cloud

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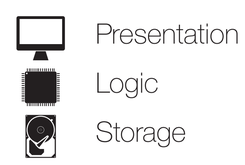
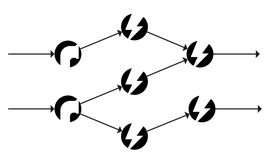
How to abstract web services' usage variation from developpement ?

A popular web service might grow from thousands to millions of users in a matters of days.
To react to such variation of usage, they have to be scalable.

The classical approaches - the **three tiers** architecture, frameworks like **storm** or **languages** like Erlang - allow developer to split web services into well defined parts in order to be scalable.



Three tiers architecture


Storm

Instead we want to **automatically** split a web service into **stateless parts**, and make them communicate by **volatile data streams**.

The persistence is decoupled from the logic and managed into the messaging system.

Statelessness and volatility assure the web service to be **frictionless***, and the association with this fine decomposition, make it **scalable**.

***Frictionless** : independent from the hardware allowing it to be moved at runtime without relocation of ressources.

In a context of **data-stream oriented** web services written in **javascript**, we want
+ to create a **frictionless*** execution model and
+ to **transpile** standard web services into this model

Example : a visit counter

// simple javascript

```
var count = {};

app.get('/:id', function(req, res){
  return router(req.params.id, res);
});

function router(userId, res) {
  data = count[userId] || 0;
  return process(userId, data, res);
}

function process(userId, inputData, res) {
  value = inputData + 1;
  response = 'Count(' + userId+ ') : ' + value;
  return store(userId, value, response, res);
}

function store(userId, value, outputData, res){
  count[userId] = value;
  return send(outputData, res);
}

function send(outputData, res) {
  return res.send(outputData);
}

app.listen(port);
```

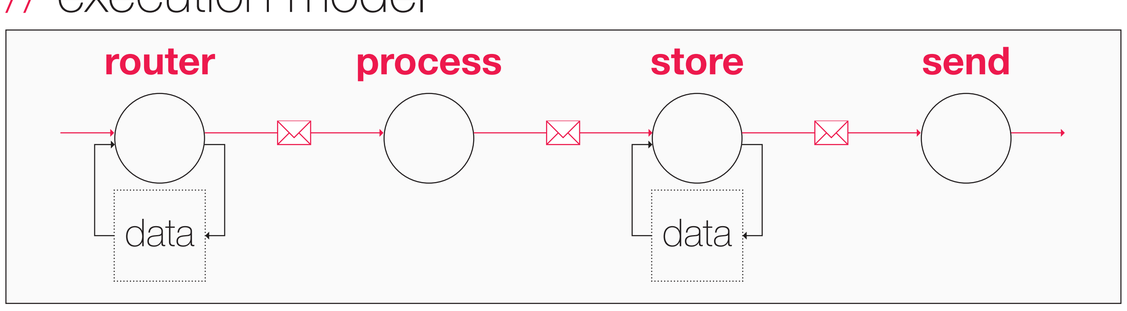
Extraction

// frictionless model

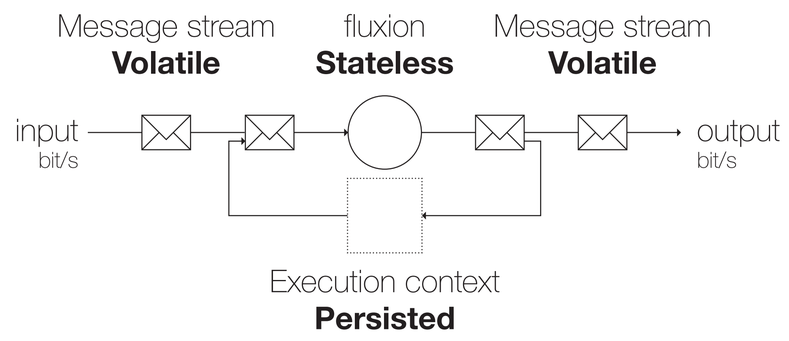
```
input >> router
router >> process | count
process >> store
store >> send | count
send >> output
```

Execution

// execution model



Execution model



Our **execution model** is composed of :

Fluxion, stateless parts, listens for, modifies and sends messages to other fluxions.

Execution context are persisted memory states needed by fluxions.

Messaging system keeps tracks of fluxions, and delivers volatile message streams.
+ Binds context execution and messages.
+ Moves fluxions and contexts to balance load.

Progression & Objectives

We aim to transpile any javascript web service into one which can adapt dynamically to load.
Without the development constraints imposed by other approaches.

DONE a javascript library to express and execute a fluxional program written in javascript.

TODO enhance this library with the automatic migration of fluxions, and create a langage with a compiler to javascript.