THIS PRESENTATION CODE IS ON
HTTPS://GITHUB.COM/GABRIELELANA/NODE-EXAMPLES

CleanCode

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WHY NODE.JS?

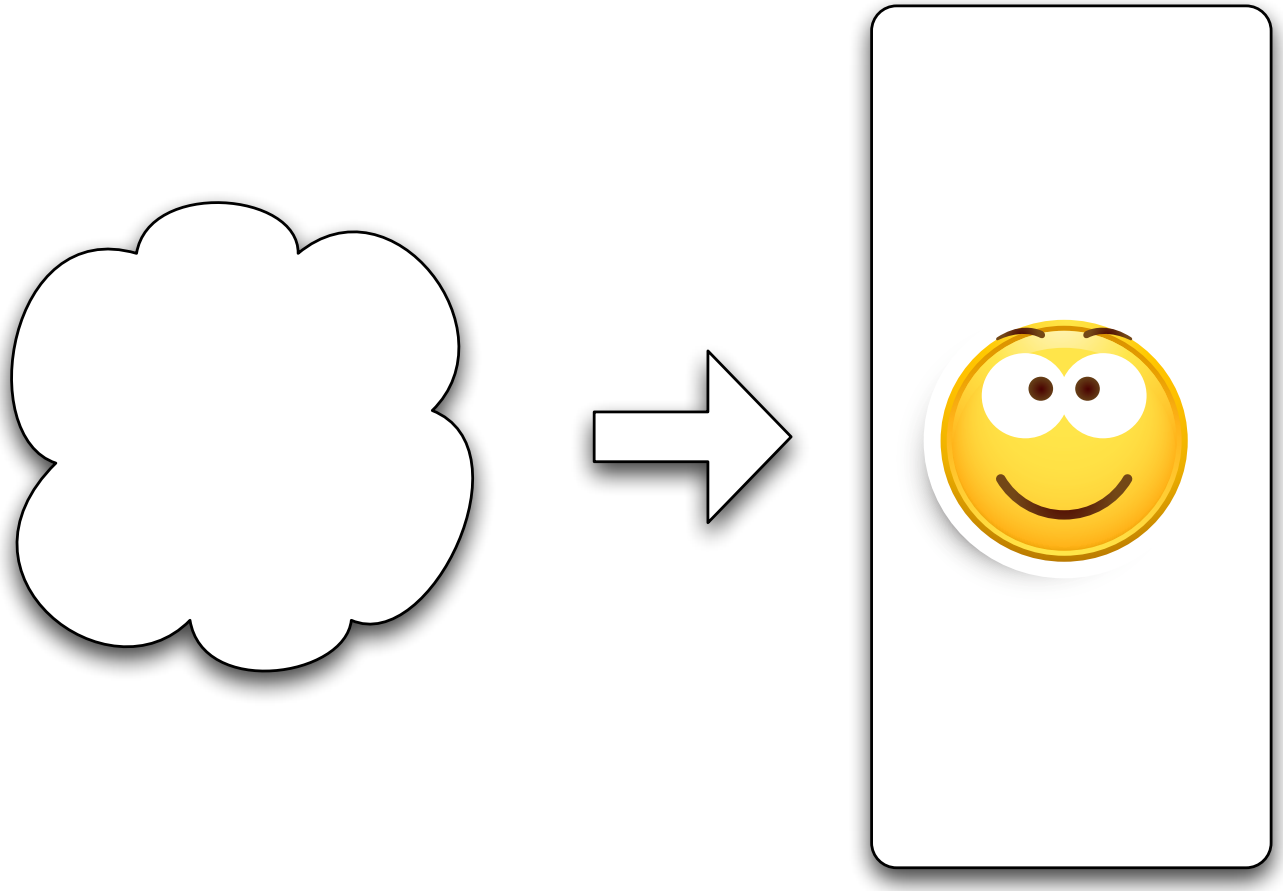
"NODE'S GOAL IS TO PROVIDE AN EASY WAY TO BUILD SCALABLE NETWORK PROGRAMS"

HTTP://NODEJS.ORG/#ABOUT

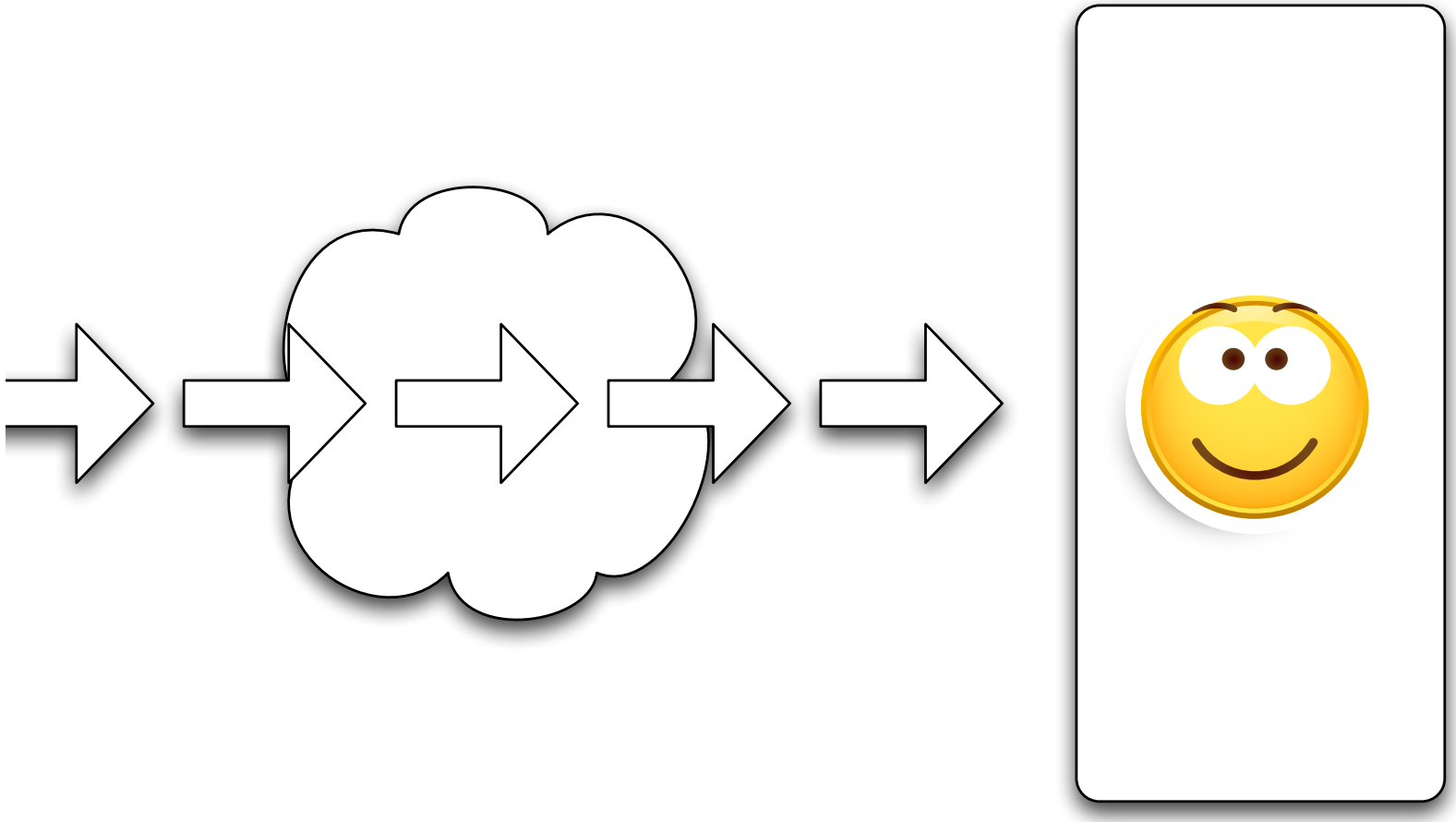
WHAT IS NODE.JS?

- ASYNCHRONOUS I/O FRAMEWORK
- CORE IN C++ ON TOP OF V8
- REST OF IT IN JAVASCRIPT
- SWISS ARMY KNIFE FOR NETWORK RELATED STUFFS
- CAN HANDLE THOUSANDS OF CONCURRENT CONNECTIONS WITH MINIMAL OVERHEAD (CPU/MEMORY) ON A SINGLE PROCESS

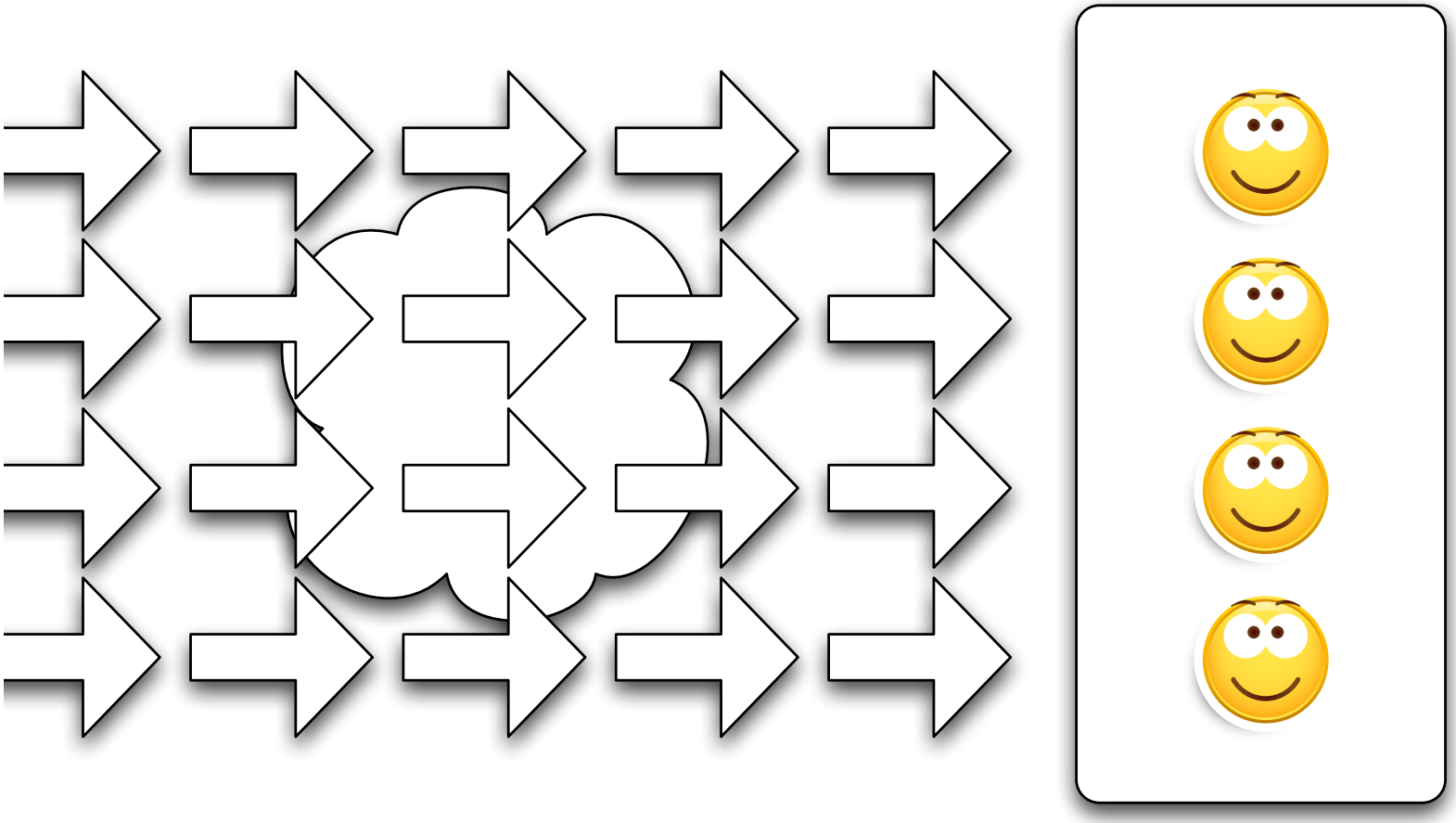
SINGLE THREAD SYNCHRONOUS I/O



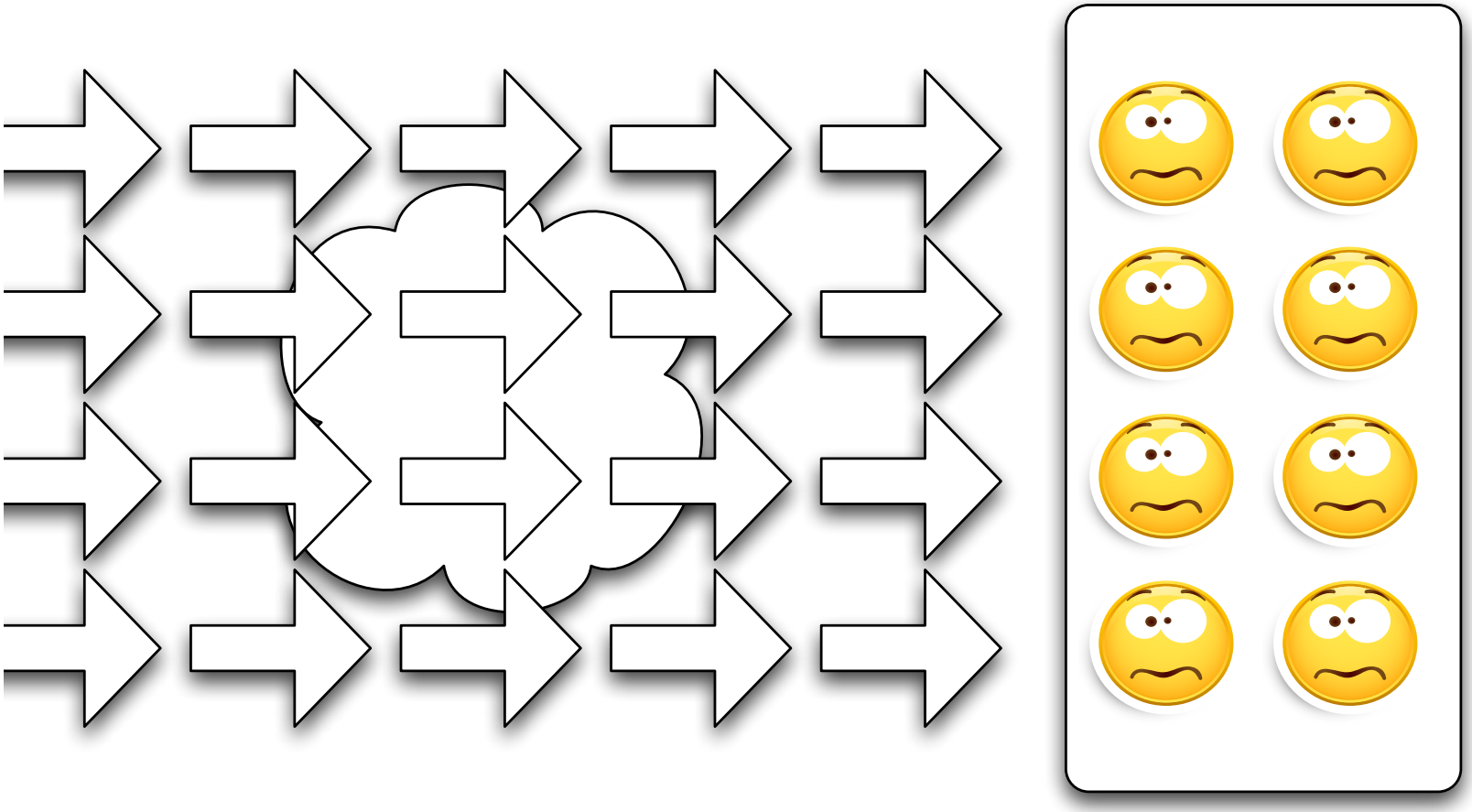
SINGLE THREAD SYNCHRONOUS I/O



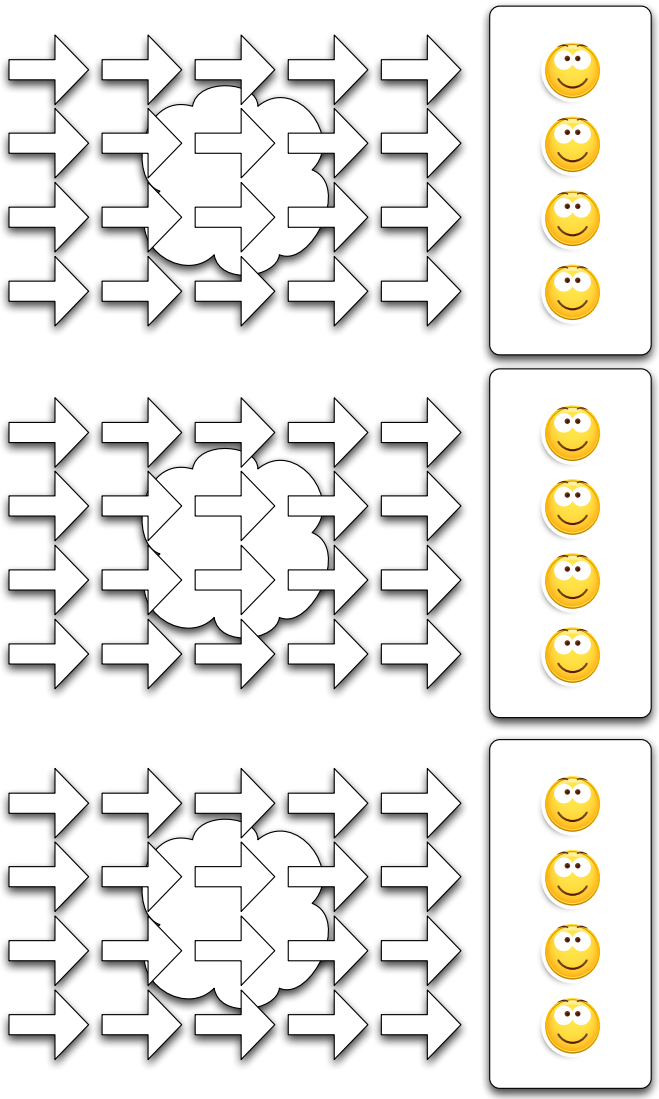
MULTIPLE THREAD SYNCHRONOUS I/O



MULTIPLE THREAD SYNCHRONOUS I/O



YOU CAN "ALWAYS" SCALE WITH MULTIPLE MACHINES BUT IT COSTS YOU $$$



BUT...
WHAT IS HE
DOING?

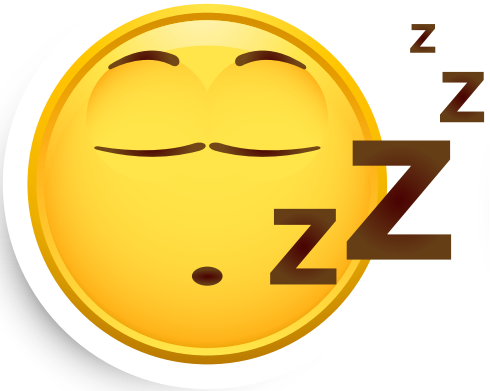
CPU BOUND TASKS?

BUT... WHAT IS HE DOING?

CPU BOUND TASKS?

BUT... WHAT IS HE DOING?

...OR I/O BOUND TASKS?



SYNCHRONOUS I/O

```
function productsInCart(request, response) {
    var db = new Db()
    var user = new User(request)
    if (user.isAuthorized("cart/products")) {
        response.write(
            JSON.stringify(
                db.productsInCart(user.cartId())
            )
        )
    } else {
        response.unauthorized()
    }
}
```

SYNCHRONOUS I/O

```
function productsInCar                    , response) {
    var db = new Db()
    var user = new User(request)
    if (user.isAuthorized("cart/products")) {
        response.write(
            JSON.stringify(
                db.productsInCart(user.cartId())
            )
        )
    } else {
        response.unauthorized()
    }
}
```

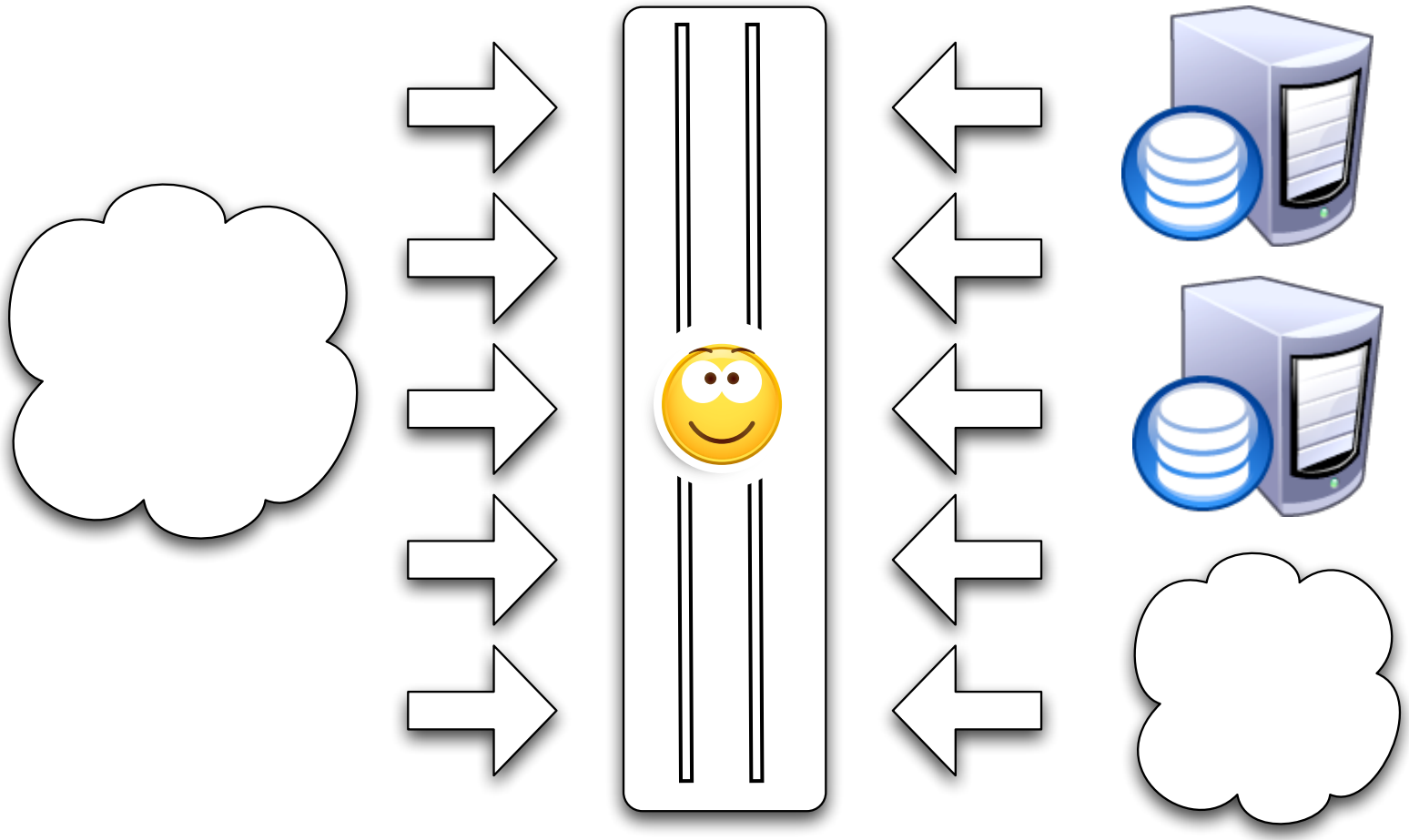
SYNCHRONOUS I/O

```
function productsInCar                    se) {
    var db = new Db()
    var user = new User(request)
    if (user.isAuthorized("cart/products")) {
        response.write(
            JSON.stringify(
                db.productsInCart(user.cartId())
            )
        )
    } else {
        response.unauthorized()
    }
}
```

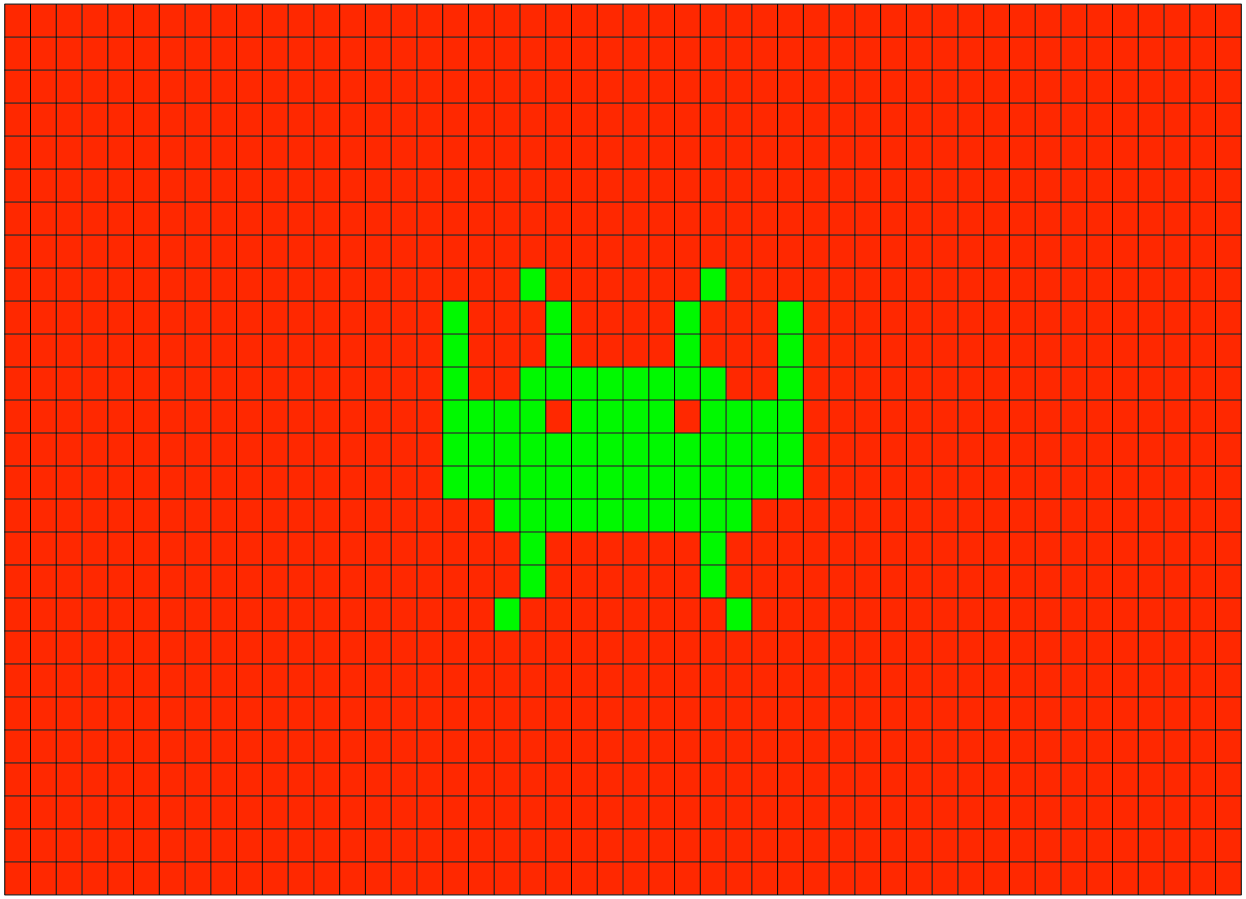
SYNCHRONOUS I/O

```
function productsInCar                    se) {
    var db = new Db()
    var user = new User(request)
    if (user.isAuthorized("                oducts")) {
        response.write(
            JSON.stringify(
                db.productsInCart(user.cartId())
            )
        )
    } else {
        response.unauthorized()
    }
}
```

SINGLE THREAD ASYNCHRONOUS I/O



SINGLE SOURCE EVENTS



HTTP://WWW.INFOQ.COM/PRESENTATIONS/DEATH-BY-ACCIDENTAL-COMPLEXITY

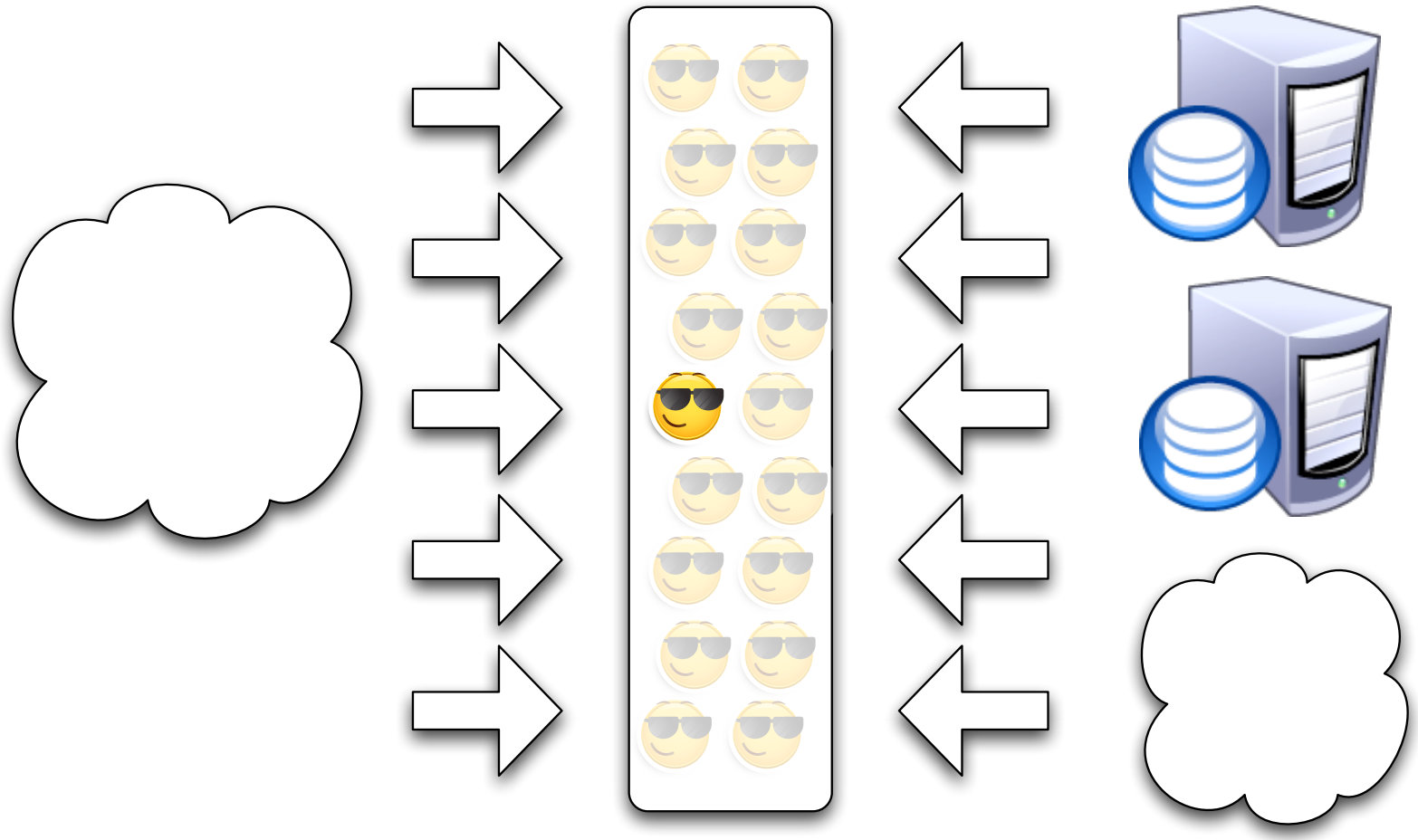
SINGLE SOURCE EVENTS

```
function productsInCart(request, response) {
    var db = null, user = null, ...
    createDb()
    handle(function(source, event) {
        if (event["name"] === "createDb") {
            if (db === null) {
                db = event.data
                createUser(request)
            } else {
                ????
            }
        } else if (event["name"] === "createUser") {
            if (user === null) {
                user = event.data
                ...
            } else {
                ???
            }
        ...
        } else {
            source.push(event, state)
        }
    }, "_initial")
}
```

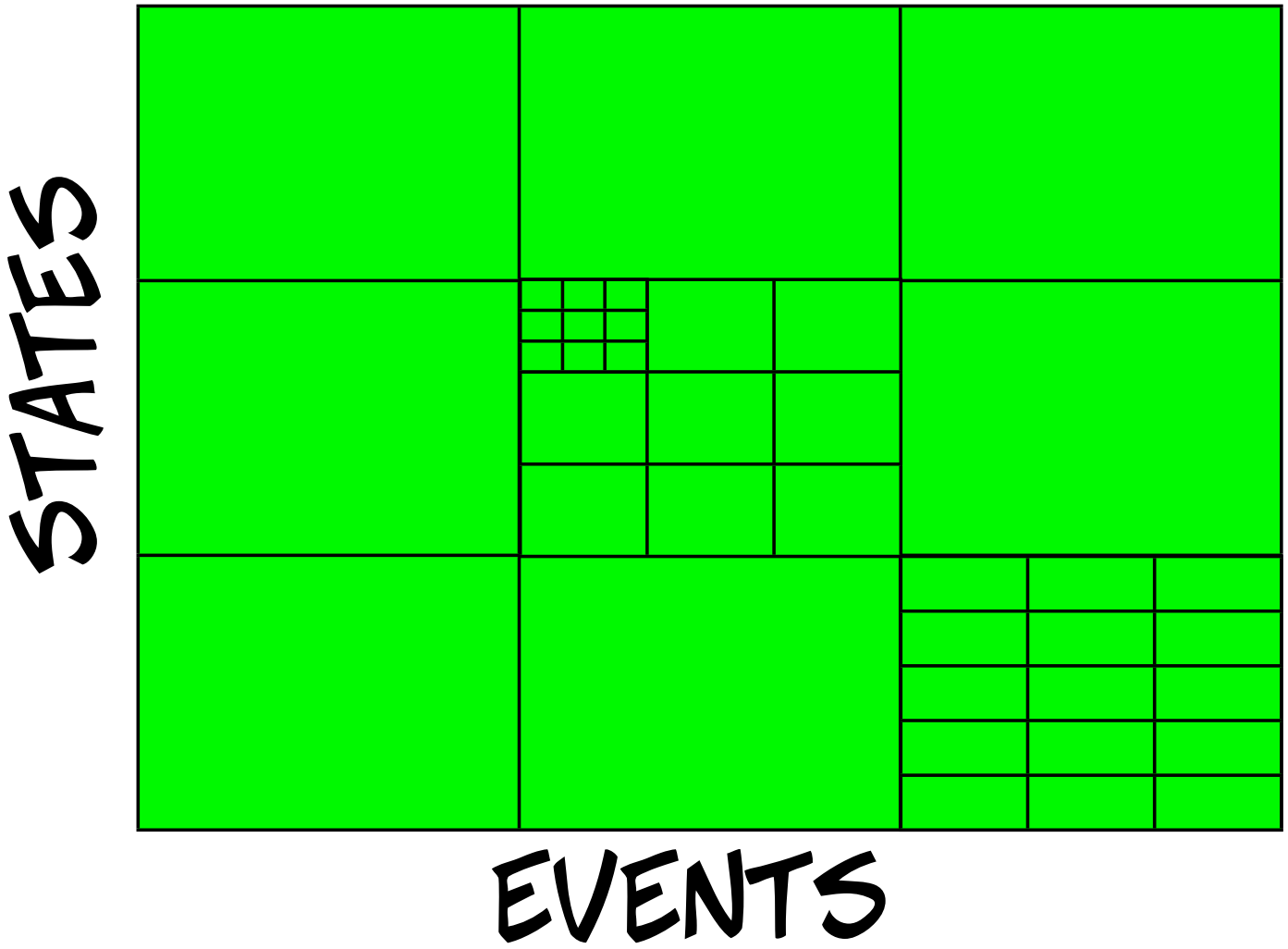
SINGLE THREAD ASYNCHRONOUS I/O

I AM "CALLBACK" CALL ME IF YOU NEED ME...

SINGLE THREAD ASYNCHRONOUS I/O



MULTIPLE SOURCE EVENTS (LOCAL STATE)



MULTIPLE SOURCE EVENTS (LOCAL STATE)

```
function productsInCart(request, response) {
    createDb(function(db) {
        createUser(function(user) {
            if (user.isAuthorized("cart/products") {
                response.write(
                    JSON.stringify(
                        db.productsInCart(user.cartId())
                    )
                )
                response.end()
            }) else {
                response.unauthorized()
            }
        })
    })
}
```

MULTIPLE SOURCE EVENTS (LOCAL STATE)

```
function productsInCart(request, response) {
    createDb(function(db) {
        createUser(function(user) {
            if (user.isAuthorized("cart/products") {
                response.write(
                    JSON.stringify(
                        db.productsInCart(user.cartId())
                    )
                )
                response.end()
            }) else {
                response.unauthorized()
            }
        })
    })
}
```

EVENT EMITTER (LOCAL STATE)

```
var http = require("http")

var server = http.createServer(function(request, response) {
  response.writeHead(200, {
    "Content-Type": "plain/text"
  })
  response.write("Hello World\n")
  response.end()
})

server.listen(8080)

console.log("> SERVER STARTED")
```

01#HELLO_WORLD/HELLO_WORLD_SERVER.JS

EVENT EMITTER (LOCAL STATE)

```
var http = require("http")

var server = http.createServer(function(request, response) {
  response.writeHead(200, {
    "Content-Type": "plain/text"
  })
  response.write("Hello World\n")
  response.end()
})

server.listen(8080)

console.log("> SERVER STARTED")
```

01#HELLO_WORLD/HELLO_WORLD_SERVER.JS

EVENT EMITTER (LOCAL STATE)

```
var http = require("http")

var server = http.createServer(function(request, response) {
  response.writeHead(200, {
    "Content-Type": "plain/text"
  })
  response.write("Hello World\n")
  response.end()
})

server.listen(8080)

console.log("> SERVER STARTED")
```

01#HELLO_WORLD/HELLO_WORLD_SERVER.JS


```
var http = require("http")

var server = http.createServer(function(request, response) {
  response.writeHead(200, {
    "Content-Type": "plain/text"
  })
  response.write("Hello World\n")
  response.end()
})

server.listen(8080)

console.log("> SERVER STARTED")
```

01#HELLO_WORLD/HELLO_WORLD_SERVER.JS

EVENT EMITTER (LOCAL STATE)

```
coder@apollo:~/Work/src/node/examples$ node hello_world_server.js
> SERVER STARTED
```

#1

```
coder@apollo:~$ curl "http://localhost:8080/"
Hello World
```

#2

EVENT EMITTER (LOCAL STATE)

```
var server = require("http").createServer()

server.on("request", function(request, response) {
  console.log("> REQUEST STARTED")
  request.on("end", function() {
    console.log("> REQUEST CLOSED")
    response.writeHead(200, {
      "Content-Type": "plain/text"
    })
    response.end("Hello World\n")
    server.close()
  })
  response.on("close", function() {
    console.log("> RESPONSE CLOSED")
  })
})
```

01#HELLO_WORLD/HELLO_WORLD_SERVER_EMITTER.JS

EVENT EMITTER (LOCAL STATE)

```
...

server.on("close", function() {
  console.log("> SERVER CLOSED")
})

server.on("listening", function() {
  console.log("> SERVER STARTED")
})

server.listen(8080)
```

01#HELLO_WORLD/HELLO_WORLD_SERVER_EMITTER.JS

EVENT EMITTER (LOCAL STATE)

```
coder@apollo:~/Work/src/node/examples$ node hello_world_server.js
> SERVER STARTED
```

#1

```
coder@apollo:~$ curl "http://localhost:8080/"
Hello World
```

#2

```
> REQUEST STARTED
> REQUEST CLOSED
> SERVER CLOSED
```

#1

nodeJS

WHY SO COMPLICATED?

nodeJS

DATA STREAMS

```
server.on("request", function(request, response) {
  var chunks = [],
      output = fs.createWriteStream("./output")

  request.on("data", function(chunk) {
    chunks = forEachLine(chunks.concat(chunk), function(line) {
      output.write(parseInt(line, 10) * 2)
      output.write("\n")
    })
  })

  request.on("end", function() {
    response.writeHead(200, { "Content-Type": "plain/text" })
    response.end("OK\n")
    output.end()
    server.close()
  })
})
```

02#PROXY_STREAM/PROXY_STREAM.JS

EVENT EMITTER (LOCAL STATE)

```
coder@apollo:~/Work/src/node/examples$ node stream_doubler.js
```

#1

```
coder@apollo:~$ curl "http://localhost:8080/" --data $'1\n2\n3\n'
OK
```

#2

```
coder@apollo:~/Work/src/node/examples$ cat output
2
4
6
```

#1

nodeJS

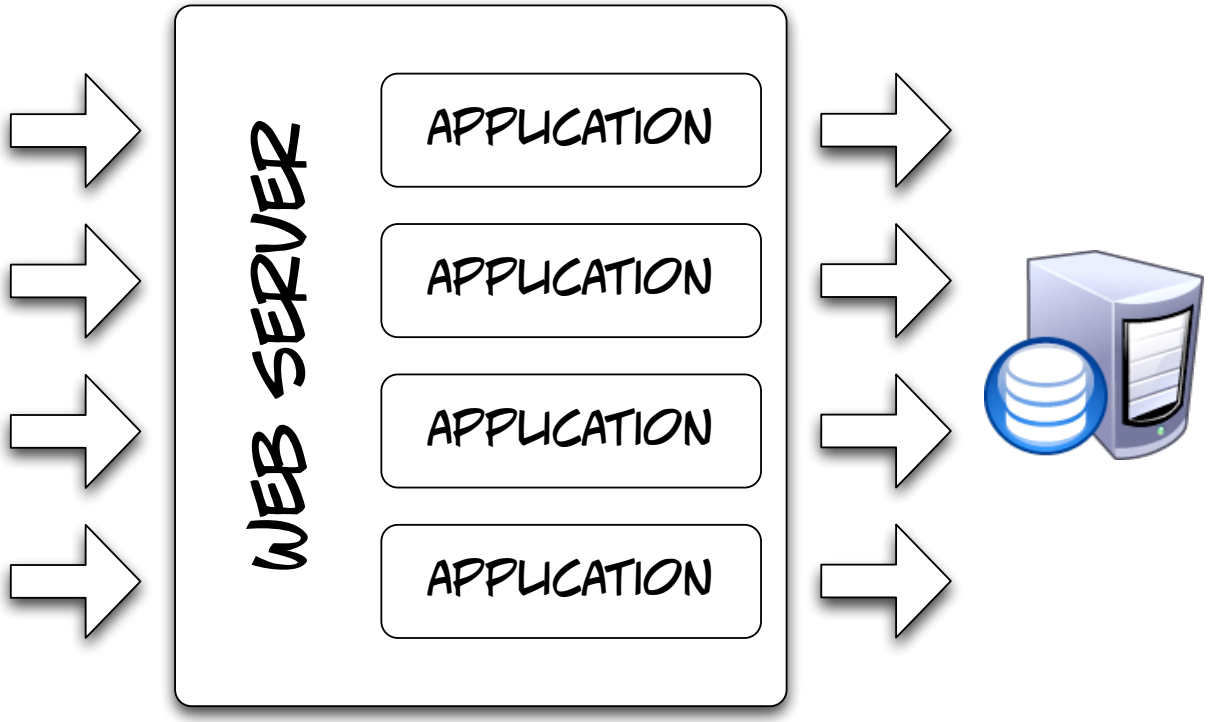
WHY JAVASCRIPT?

- FRIENDLY CALLBACKS
- UBIQUITOUS ~~(WELL KNOWN)~~
- NO I/O PRIMITIVES
- ONE LANGUAGE TO RULE THEM ALL

nodeJS

MIND SHIFT #1

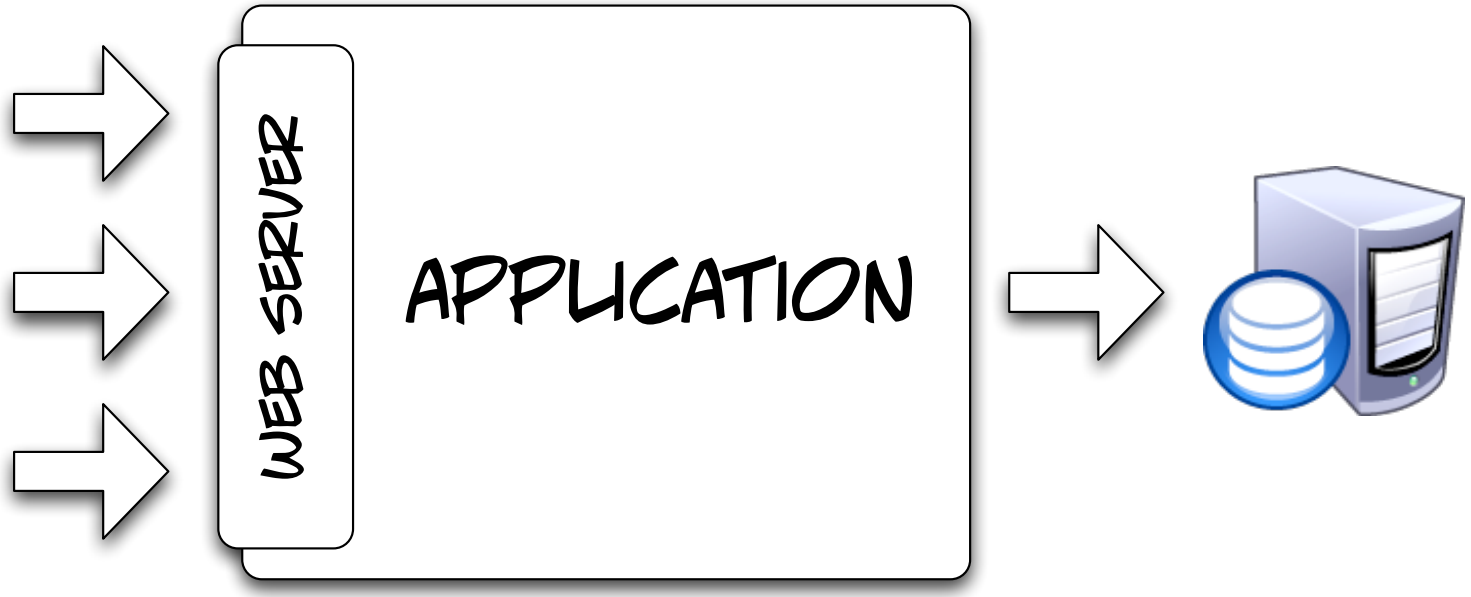
WEB APPLICATIONS BEFORE: A WEB SERVER WITH SOME APPLICATION LOGIC



nodeJS

MIND SHIFT #1

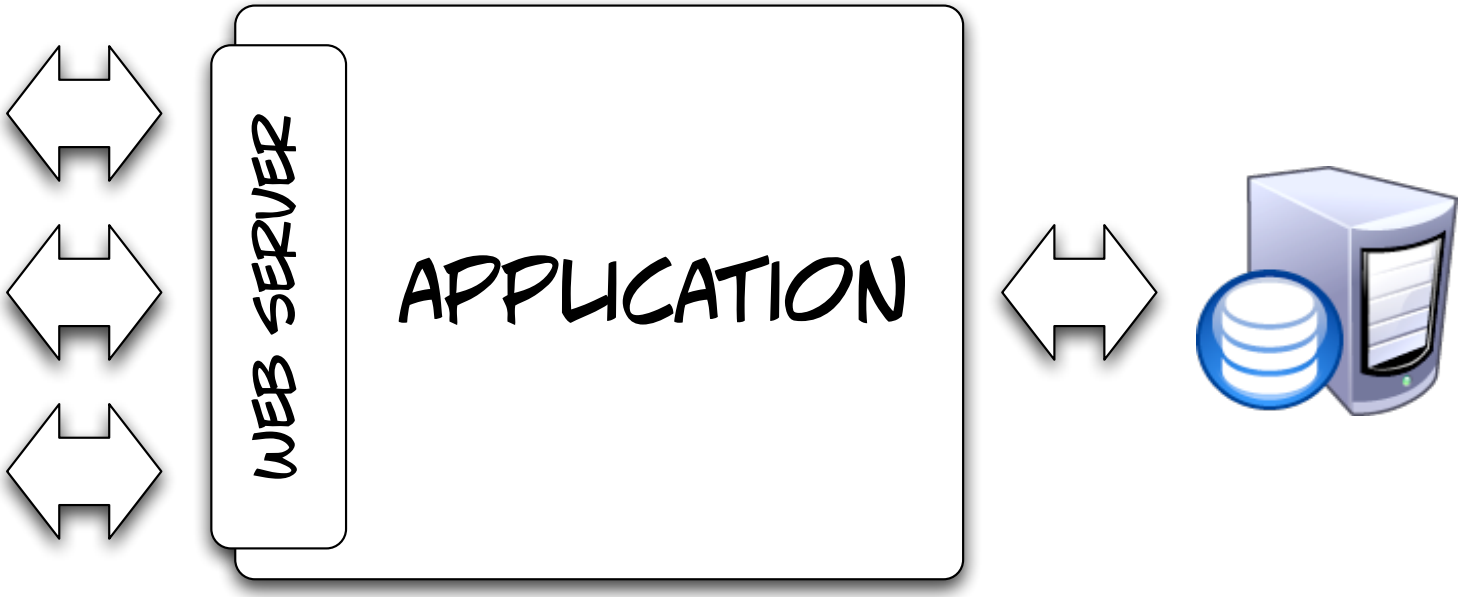
WEB APPLICATIONS AFTER: AN APPLICATION ACCESSIBLE OVER HTTP



node.JS

MIND SHIFT #1

WEB APPLICATIONS AFTER: AN APPLICATION THAT CAN COMMUNICATE AND COLLABORATE WITH THE WORLD

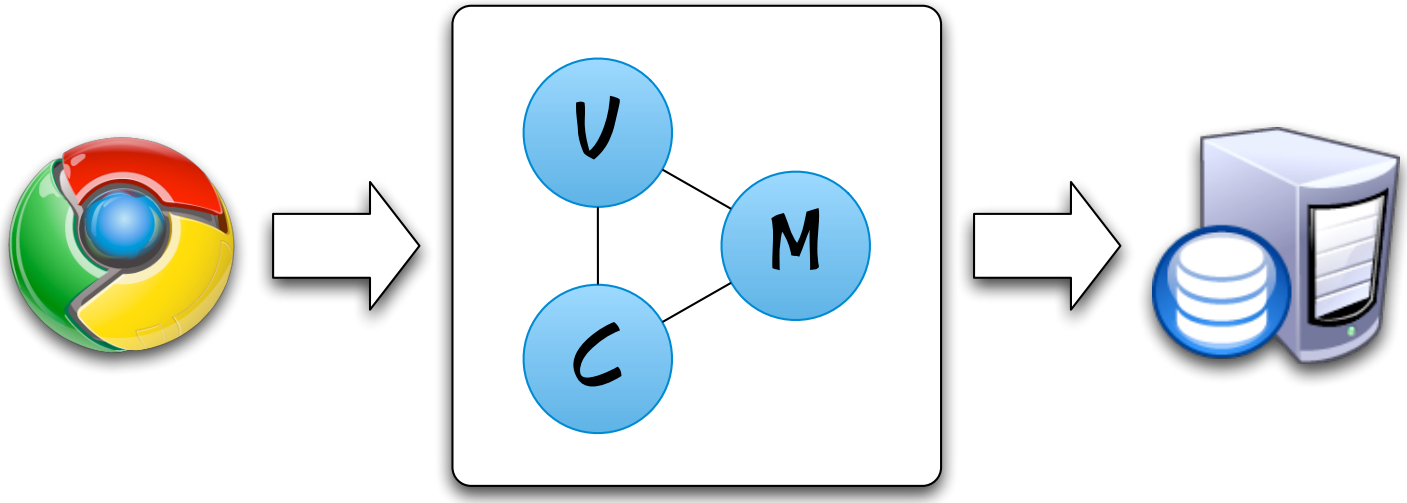


nodeJS

MIND SHIFT #2

WEB APPLICATIONS BEFORE: STATEFUL

- NO EASY TO SCALE
- NO EASY TO REUSE

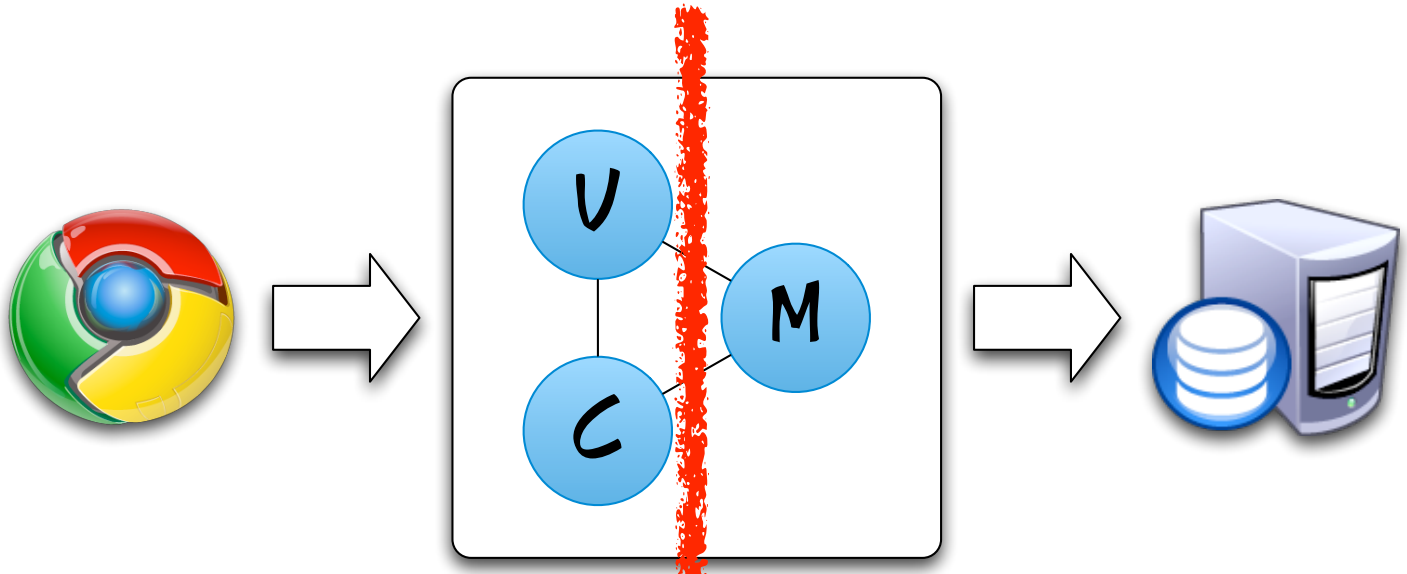


nodeJS

MIND SHIFT #2

WEB APPLICATIONS BEFORE: STATEFUL

- NO EASY TO SCALE
- NO EASY TO REUSE



CONVERSATION STATE

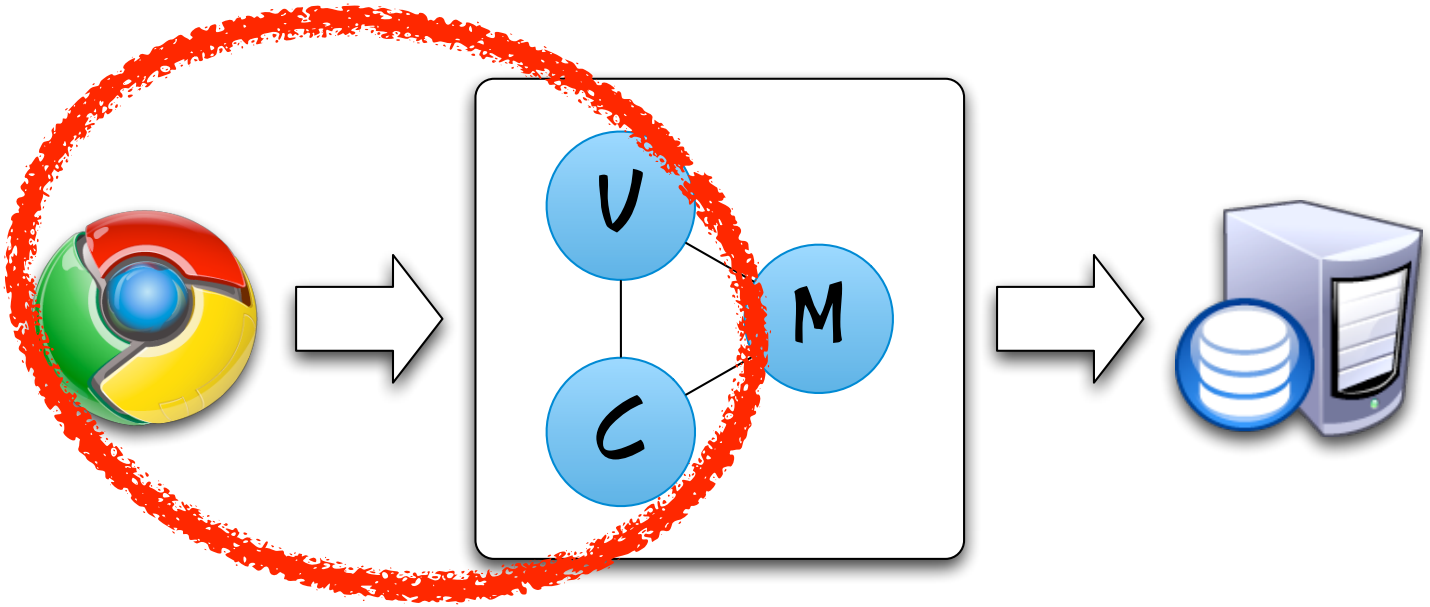
APPLICATION STATE

nodeJS

MIND SHIFT #2

WEB APPLICATIONS BEFORE: STATEFUL

- NO EASY TO SCALE
- NO EASY TO REUSE



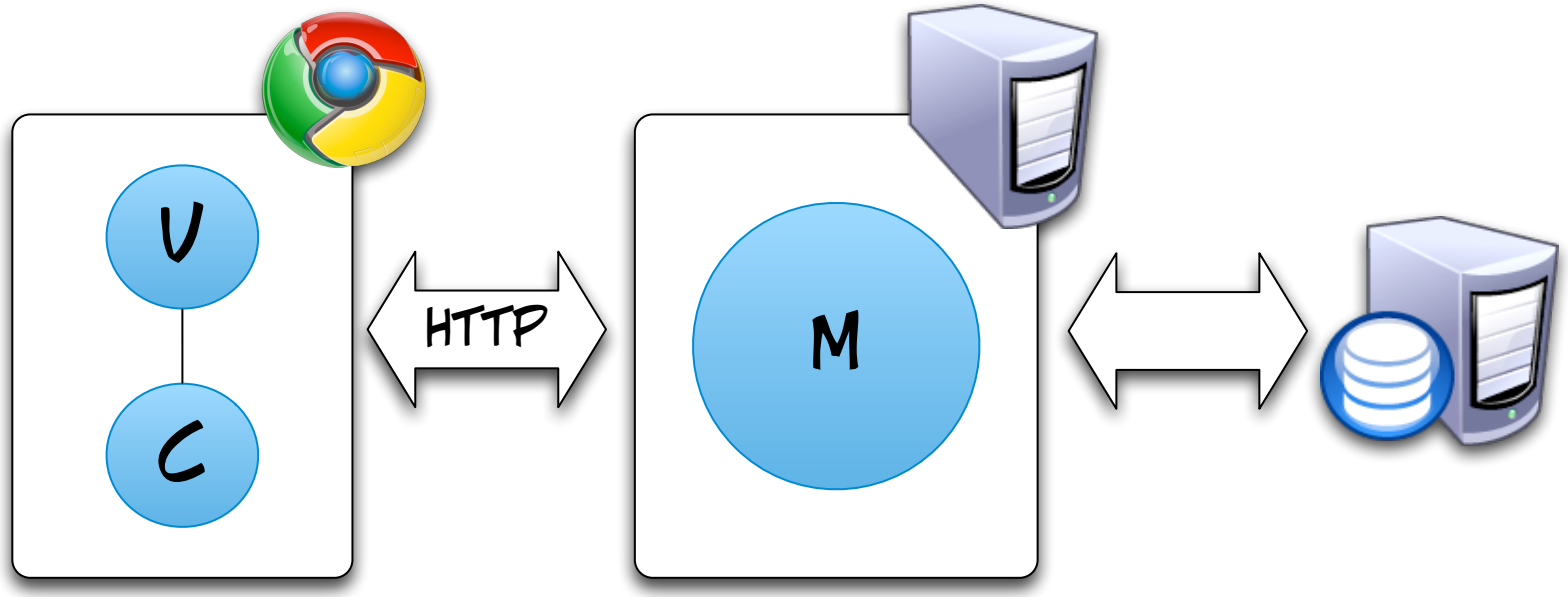
TIGHTLY COUPLED

nodeJS

MIND SHIFT #2

WEB APPLICATIONS AFTER: STATELESS

- EASY TO SCALE
- EASY TO REUSE

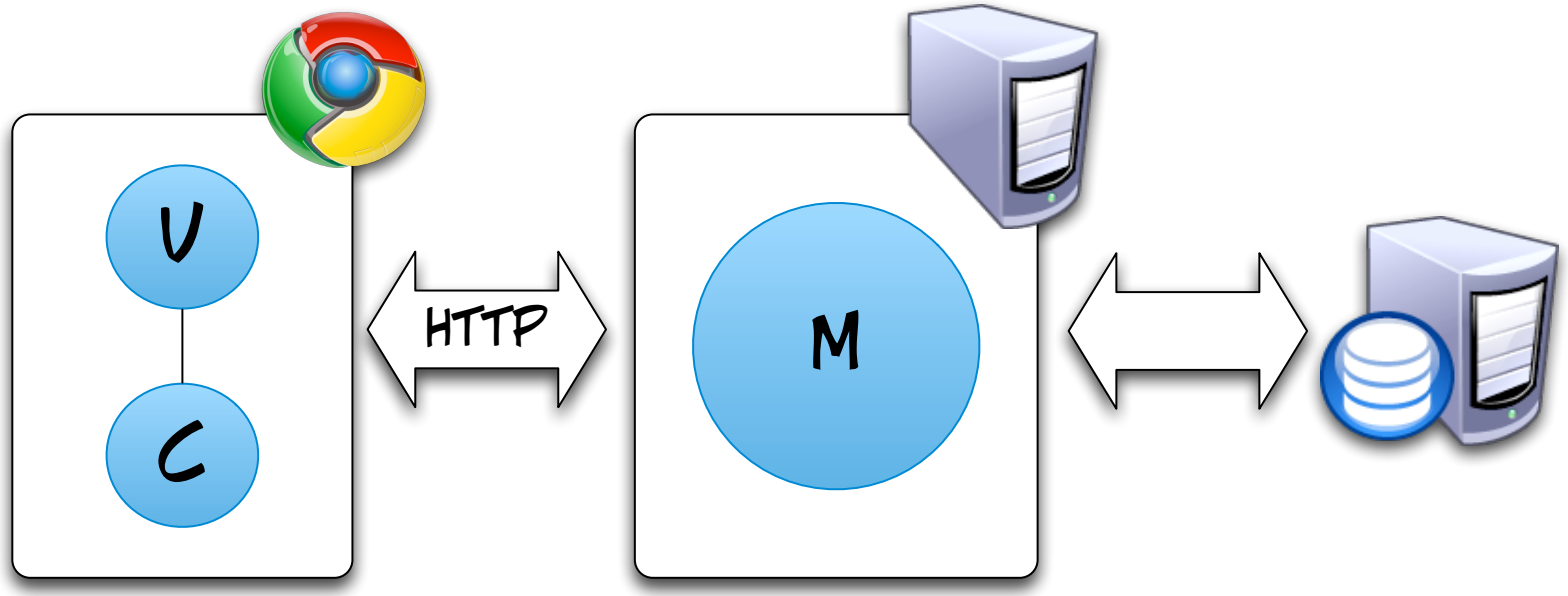


nodeJS

MIND SHIFT #2

WEB APPLICATIONS AFTER: STATELESS

- EASY TO SCALE
- EASY TO REUSE



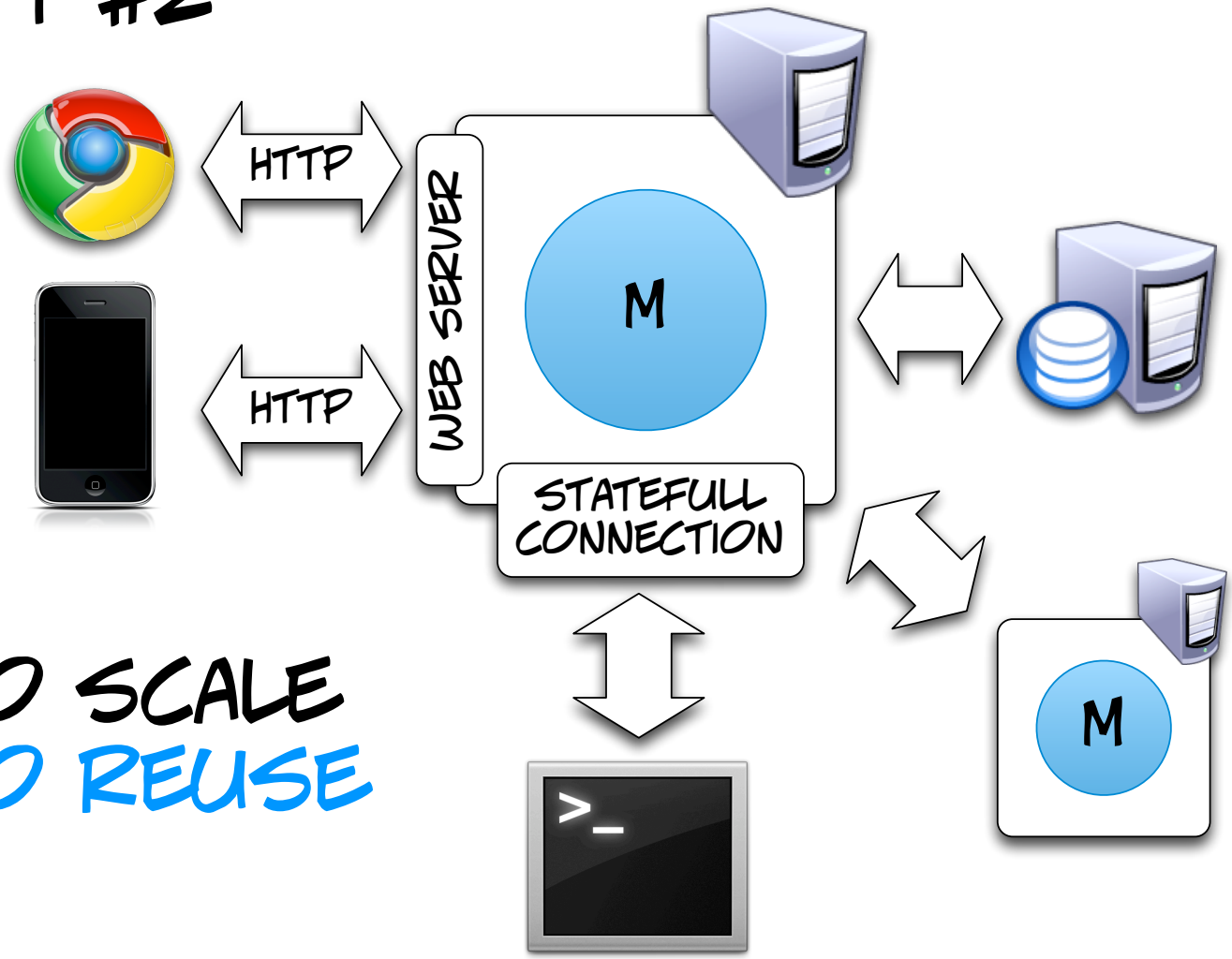
CONVERSATION STATE

APPLICATION STATE

nodeJS

MIND SHIFT #2

WEB APPLICATIONS AFTER: STATELESS



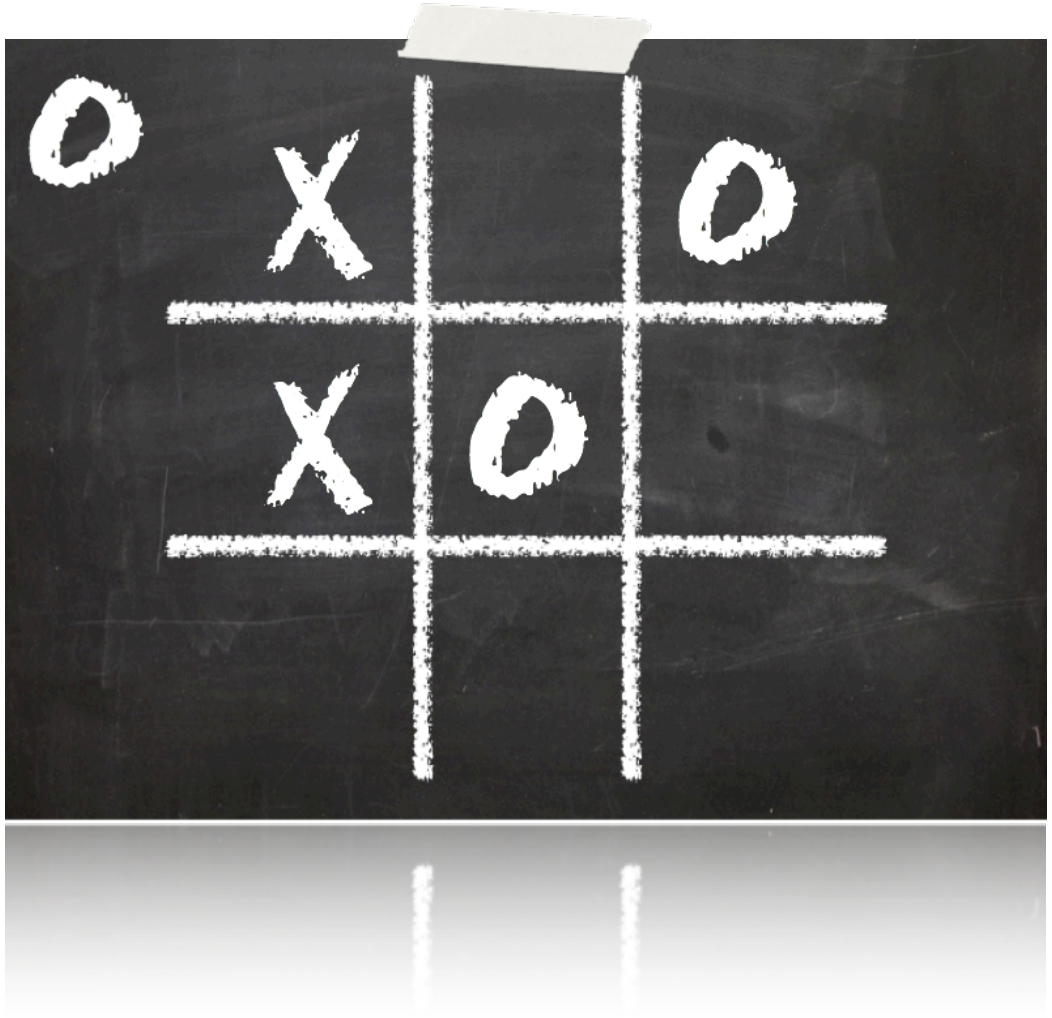
- EASY TO SCALE
- EASY TO REUSE

nodeJS

NO FLUFF
JUST STUFF

node.JS

TIC - TAC - TOE



TIC - TAC - TOE

DEMO

INSTALL NPM
(NODE PACKET MANAGER)

```
coder@apollo:~/Work/src/node/examples$ curl http://npmjs.org/install.sh | sh
...
npm ok
It worked

coder@apollo:~/Work/src/node/examples$ npm list | wc -l
1776

coder@apollo:~/Work/src/node/examples$ npm install connect@0.2.5
coder@apollo:~/Work/src/node/examples$ npm install faye@0.5.3
coder@apollo:~/Work/src/node/examples$ npm install backbone@0.3.0
coder@apollo:~/Work/src/node/examples$ npm install underscore@1.1.2
```

node.JS STATIC HANDLER

```
var server = connect.createServer(connect.logger({ "buffer": true }))
  .use("/", connect.router(function(resource) {
    resource.get("/board", function(request, response, next) {
      request.url = "/board.html"
      next()
    })
    ...
  }), connect.staticProvider({
    "root": path.join(__dirname, "static"),
    "cache": true
  }))

server.listen(port)
```

05#TICTACTOE/SERVER.JS

nodeJS

GAME HANDLER (GENERATE BOARD-ID)

```
resource.post("/board", function(request, response) {
  response.writeHead(200, { "Content-Type": "application/json" })
  uuid(function(boardId) {
    response.end(
      JSON.stringify({
        "board": { "id": boardId }
      })
    )
  })
})
```

05#TICTACTOE/SERVER.JS

GAME HANDLER (INITIAL BOARD/USER)

```
resource.get("/board/:id", function(request, response) {
  var board = boards.get(request.params["id"])
  if (board === undefined) {
    board = new Board({ "id": request.params["id"] })
    boards.add(board)
  }
  uuid(function(userId) {
    var user = board.user(userId)
    response.writeHead(200, { "Content-Type": "application/json" })
    response.end(
      JSON.stringify({
        "board": board,
        "user": user
      })
    )
  })
})
```

05#TICTACTOE/SERVER.JS

GAME HANDLER (MAKE YOUR MOVE)

```
resource.post("/board/:id", function(request, response) {
  waitForBody(request, function(body) {
    boards.get(request.params["id"]).move(JSON.parse(body))
    response.writeHead(204, { "Content-Type": "application/json" })
    response.end(JSON.stringify({ "response": "ok" }))
  })
})
```

05#TICTACTOE/SERVER.JS

node.JS COMET HANDLER

```
var comet = new Faye.NodeAdapter({ "mount": "/comet", "timeout": 50 })

var server = connect.createServer(connect.logger({ "buffer": true }))
  .use("/comet", function(request, response, next) {
    comet.handle(request, response)
  })
  ...
})

comet.attach(server)
```

05#TICTACTOE/SERVER.JS

COMET EVENTS ON BACKBONE EVENTS

```
var client = comet.getClient()
var boards = new Backbone.Collection

boards.bind("change", function(board) {
  client.publish("/board-" + board.get("id"), board)
})
```

05#TICTACTOE/SERVER.JS

nodeJS

IN BROWSER
ROUTING

```
$(function() {

  $.sammy(function() {

    this.get("", function(context) {
      $.post("/board", function(response) {
        context.redirect("#/board/" + response["board"]["id"])
      })
    })

    ...
  }).run()
})
```

05#TICTACTOE/STATIC/BOARD.HTML

nodeJS

IN BROWSER
ROUTING/START GAME

```
var comet = new Faye.Client("/comet")
var game = new Game()

this.get("#/board/:id", function(context) {
  game.start()
  $.get("/board/" + context.params["id"], function(response) {
    game.set({ "me": new User(response.user) })
    game.set({ "board": new Board(response.board) })
    comet.connect()
    comet.subscribe("/board-" + context.params["id"], function(board) {
      game.get("board").set(board)
    })
  })
})
```

05#TICTACTOE/STATIC/BOARD.HTML

IN BROWSER
GAME LOGIC EXAMPLE

```
window.Game = Backbone.Model.extend({
  "initialize": function() {
    ...
    game.get("board").bind("change", function() {
      if (this.isMyTurn()) {
        return game.trigger("make-your-move")
      }
      return game.trigger("wait-for-move")
    })
  }
})
```

05#TICTACTOE/STATIC/JS/APPLICATION.JS

IN BROWSER
GAME LOGIC EXAMPLE

```
game.bind("play-with-board", function(cells) {
  buildBoard(['_'].concat(cells))
})

game.bind("play-with-mark", function(mark) {
  showPlayerMarker(cellMarksUrl[myMark = mark])
})

game.bind("make-your-move", function() {
  $("#board").undelegate()
  $("#board").delegate("*[id^=cell]", "mouseover", function() {
    $(this).data("cell").select()
  })
  $("#board").delegate("*[id^=cell]", "mouseout", function() {
    $(this).data("cell").unselect()
  })
  ...
```

05#TICTACTOE/STATIC/JS/APPLICATION.JS

nodeJS

WHAT ABOUT CPU BOUND TASKS?

THE FORK BE WITH YOU

```
#!/bin/bash

for count in `seq 1 100`; do
    echo $count
    sleep 0.1
done
```

03#LONG_RUNNING_JOBS/LONG_RUNNING_JOB.SH

nodeJS

THE FORK BE WITH YOU

```
var spawn = require("child_process").spawn,
    server = require("http").createServer()

server.on("request", function(request, response) {
  var job = spawn("./long_running_job.sh")

  job.stdout.on("data", function(tick) {
    response.write(tick)
  })

  job.on("exit", function() {
    response.end()
  })
})
```

03#LONG_RUNNING_JOBS/LONG_RUNNING_SERVER.JS

THE FORK BE WITH YOU

```
coder@apollo:~$ ab -c 1 -n 1 "http://localhost:8080/"
...
Concurrency Level:      1
Time taken for tests:   10.531 seconds
...
```

```
coder@apollo:~$ ab -c 1 -n 2 "http://localhost:8080/"
...
Concurrency Level:      1
Time taken for tests:   20.108 seconds
...
```

THE FORK BE WITH YOU

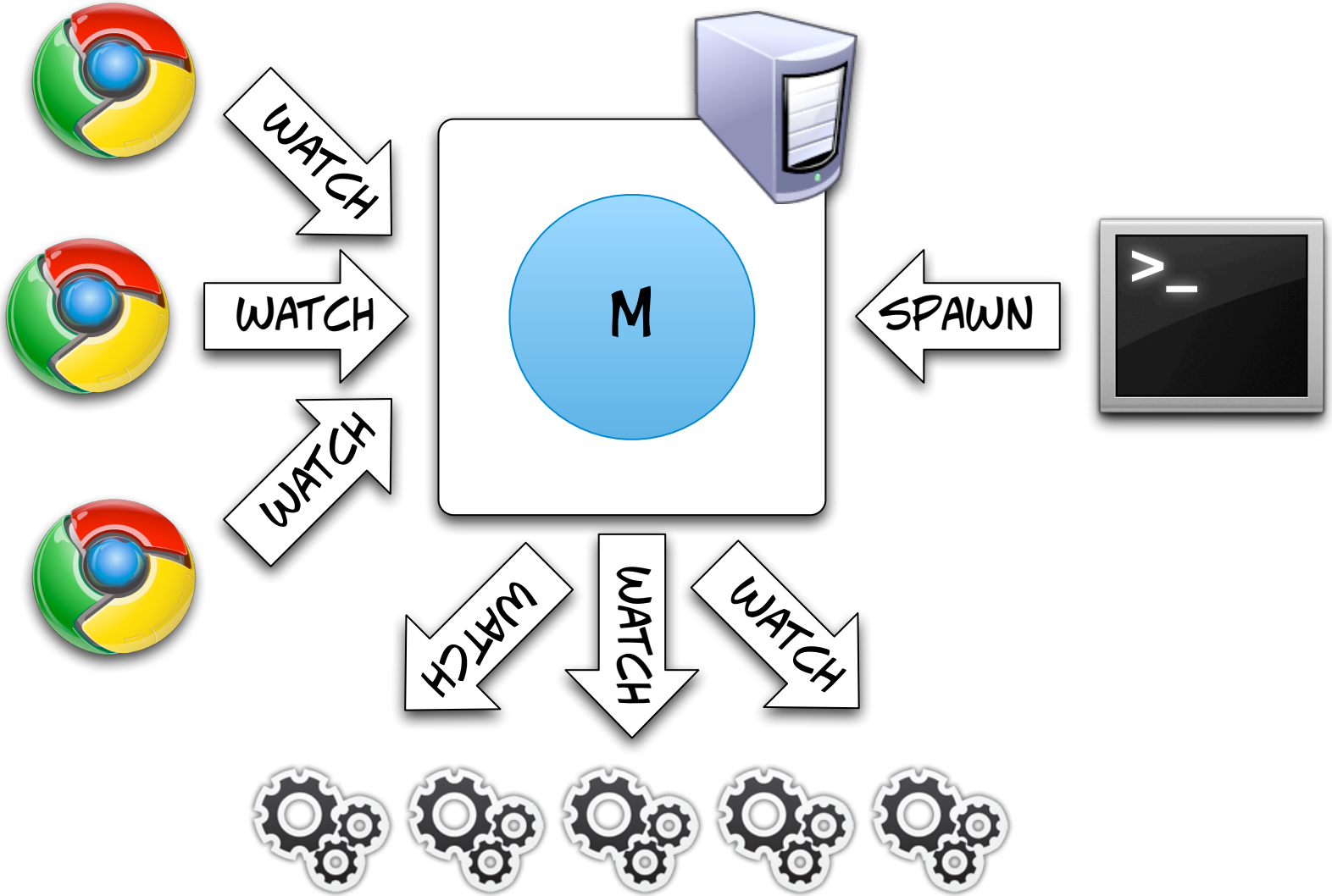
```
coder@apollo:~$ ab -c 2 -n 1 "http://localhost:8080/"
...
Concurrency Level:      2
Time taken for tests:   10.634 seconds
...

coder@apollo:~$ ab -c 100 -n 100 "http://localhost:8080/"
...
Concurrency Level:      100
Time taken for tests:   11.198 seconds
...

coder@apollo:~$ ab -c 500 -n 500 "http://localhost:8080/"
...
Concurrency Level:      500
Time taken for tests:   31.082 seconds
...
```

nodeJS

ENTER COMET



ENTER COMET

DEMO

node.JS STATIC HANDLER

```
var port = 8080

var server = connect.createServer(connect.logger())
  .use("/comet", function(request, response) { ... })
  .use("/spawn", function(request, response) { ... })
  .use("/", connect.staticProvider({
    "root": path.join(__dirname, "static"),
    "cache": true
  }))

comet.attach(server)

server.listen(port)
```

04#PROGRESS/PROGRESS_SERVER.JS

node.JS COMET HANDLER

```
var comet = new Faye.NodeAdapter({
  "mount": "/comet", "timeout": 50
})

var server = connect.createServer(connect.logger())
  .use("/comet", function(request, response, next) {
    comet.handle(request, response)
  })
  ...
```

04#PROGRESS/PROGRESS_SERVER.JS

node.JS SPAWN HANDLER

```
var client = comet.getClient(), jobCounter = 0

var server = connect.createServer(connect.logger())
  .use("/comet", function(request, response) { ... })
  .use("/spawn", function(request, response, next) {
    var worker = spawn("./long_running_process.sh"),
        jobId = jobsCounter++

    response.writeHead(200, { "Content-Type": "plain/text" })
    response.end("OK\n")

    worker.stdout.on("data", function(progress) {
      client.publish("/job-progress", {
        "id": jobId,
        "progress": parseInt(progress.toString(), 10)
      })
    })
  })
```

04#PROGRESS/PROGRESS_SERVER.JS

nodeJS IN BROWSER

```
<script>
  $(function() {
    var comet = new Faye.Client("/comet")

    comet.connect()
    comet.subscribe("/job-progress", function(job) {
      $("#template").progressBar(job.id, job.progress)
    })
  })
</script>
```

04#PROGRESS/STATIC/INDEX.HTML

nodeJS

NODE.JS IS AWESOME BUT WHEN SHOULD I USE IT?

nodeJS When to use it?

- Chat/Messaging
- Real-time applications
- Intelligent proxies
- High concurrency applications
- Communication hubs
- Coordinators

nodeJS

PLEASE TELL ME SOMETHING BAD ABOUT NODE.JS

node.JS SOME WARNINGS

- RELEASE STABLE 0.2.4 (YOUNG)
- LOTS OF STUFFS TO LOOK AT
- LOTS OF HALF BACKED STUFFS
- RETRO COMPATIBILITY???
- BAD AT HANDLING STATIC CONTENTS
- HARD TO FIND ORGANIZED AND AUTHORITATIVE INFORMATIONS

node.JS


Web Services for the Real World
RESTful Web Services
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Ian Robinson
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nodeJS

QUESTIONS?

CleanCode

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THIS PRESENTATION CODE IS ON
HTTPS://GITHUB.COM/GABRIELELANA/NODE-EXAMPLES