drracket 0.rkt … 6.rkt

— close mail and chat
— dr install sl2015
— ip # for computer
— edit chat-launch.rkt
— and chat-demo.rkt
— (define HOST …)

drracket chat-server.rkt
chat-launch.rkt
chat-demo.rkt

big-bang

matthias. racketeer

imagine

If x is 5 and y is 3,
what is x * y + 8?

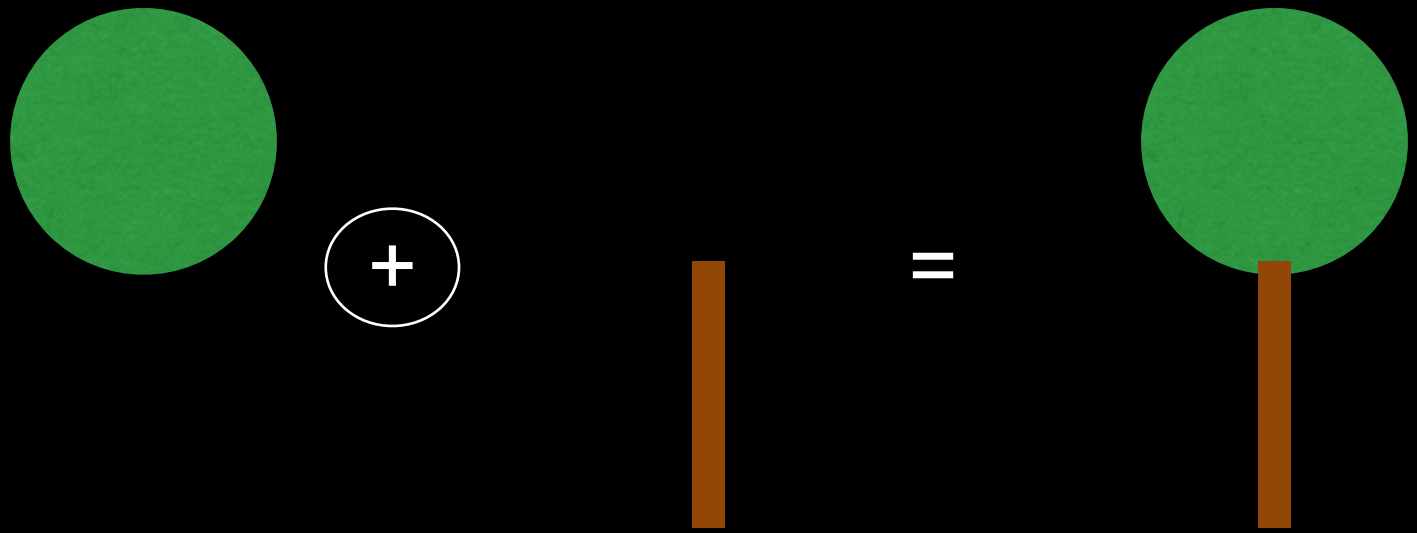
It's all about numbers.

...s on its way
...m St. Louis to Chicago.
The horse manages a steady
speed of 5 miles per hour.
...lop a variable expression
...describes how far from
St. Louis the horse is after
x hours.

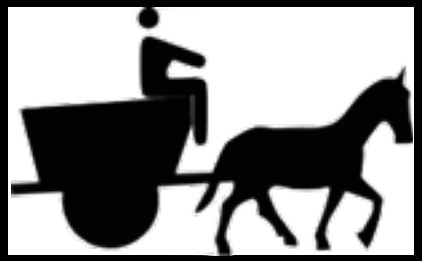
why not pictures?

movies?

Add green circle and a brown rectangle so that the result is a tree.

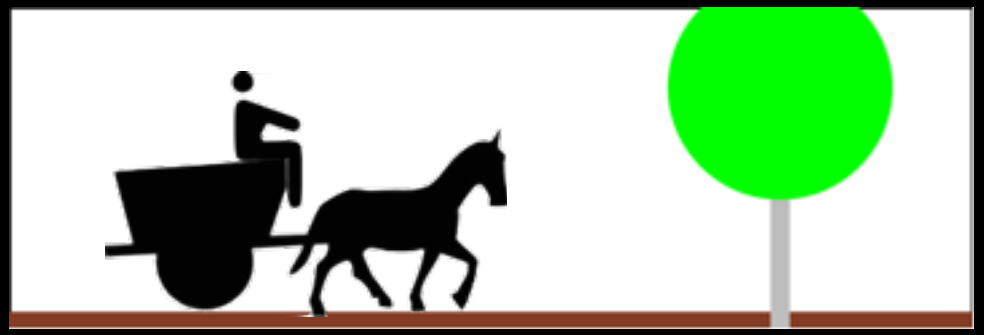


If x is



and y is

what do you get when you place x into y at (0,100)?

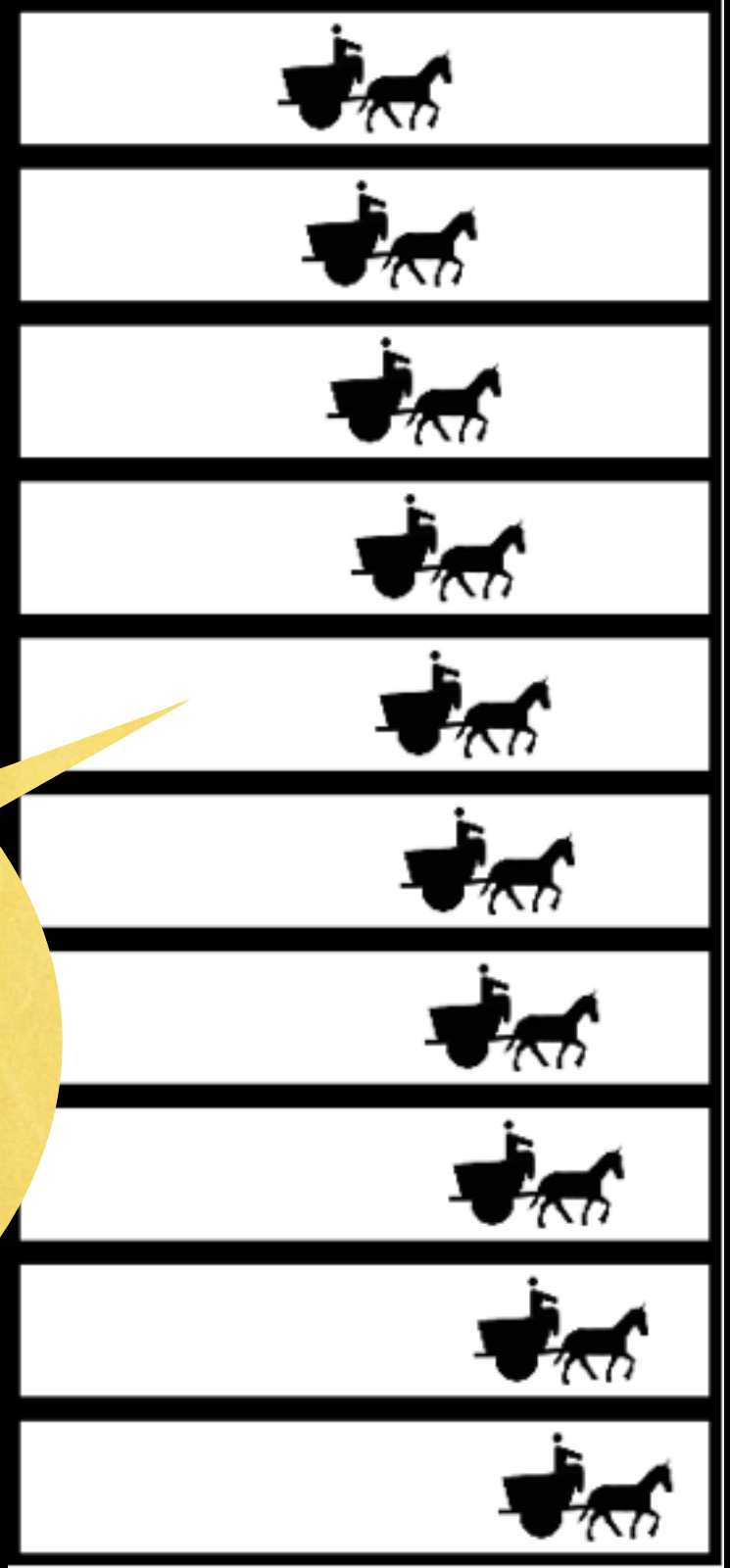


A horse buggy is on its way from St. Louis to Chicago. The horse manages a steady speed of 5 miles per hour. Draw images of the scenery when it has been on its way for 10 hours, 50 hours, and 120 hours.

t = 10	t = 50	t = 120

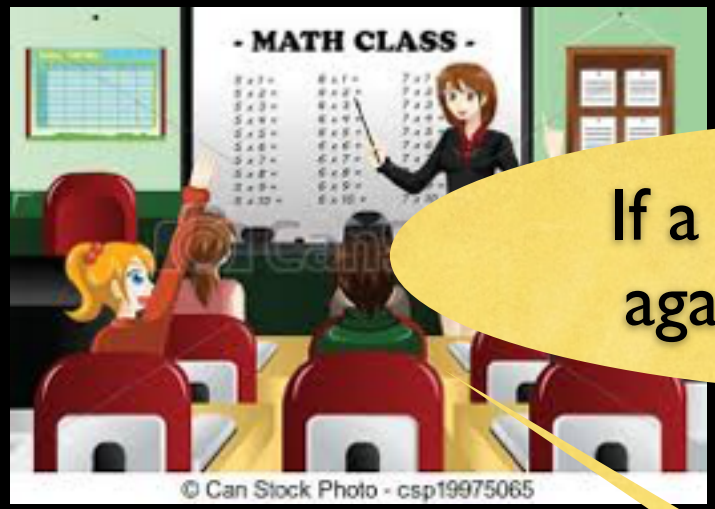
```
cart(t) =

  place( ,
         5 * t,
         white_background)
```

An animation!

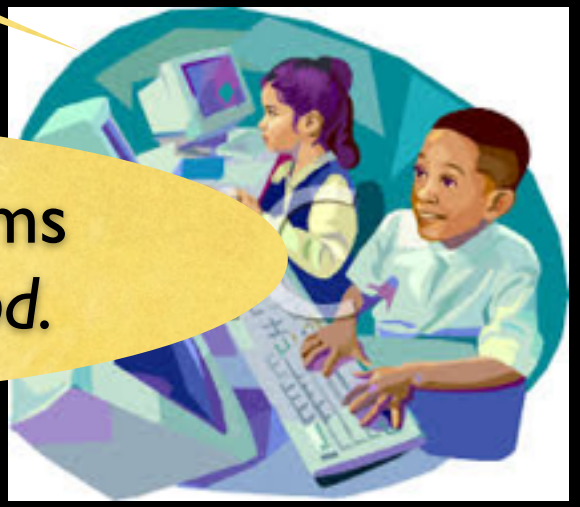


1995

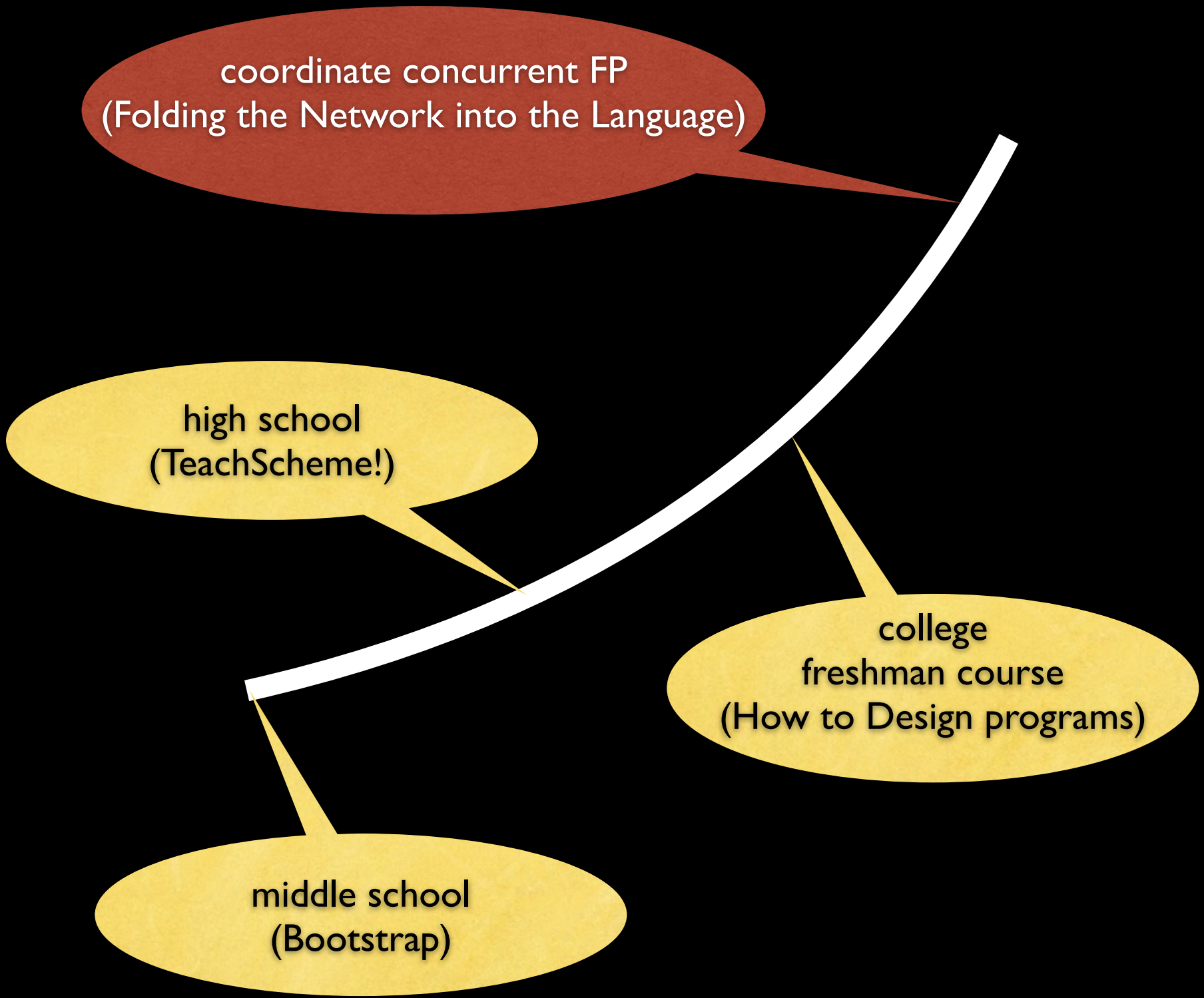
help math with programming



If a kid *never* programs again, we *still did good.*



help programming with math


coordinate concurrent FP
(Folding the Network into the Language)
high school
(TeachScheme!)
college
freshman course
(How to Design programs)
middle school
(Bootstrap)

What I will show

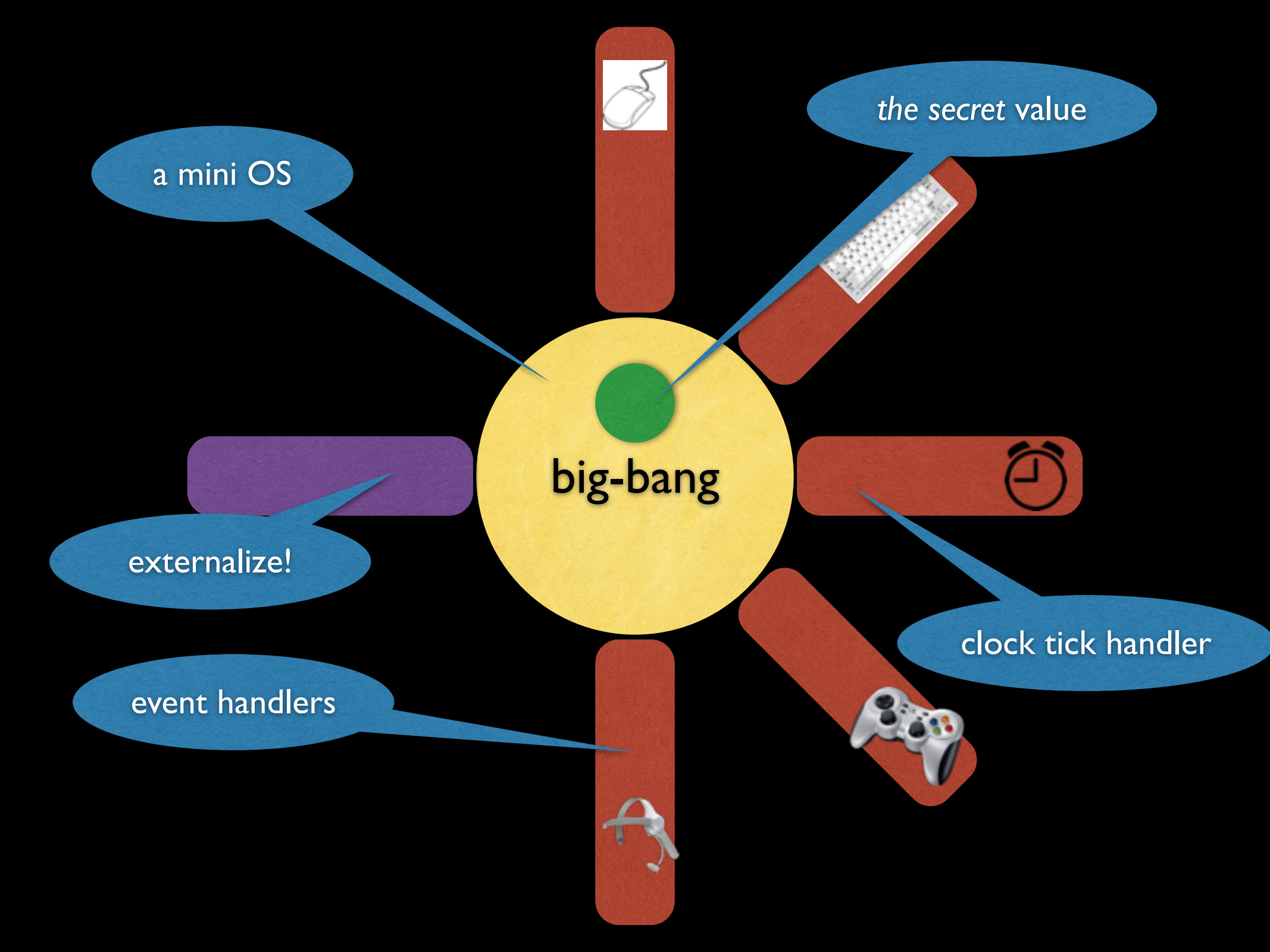
What I won't show

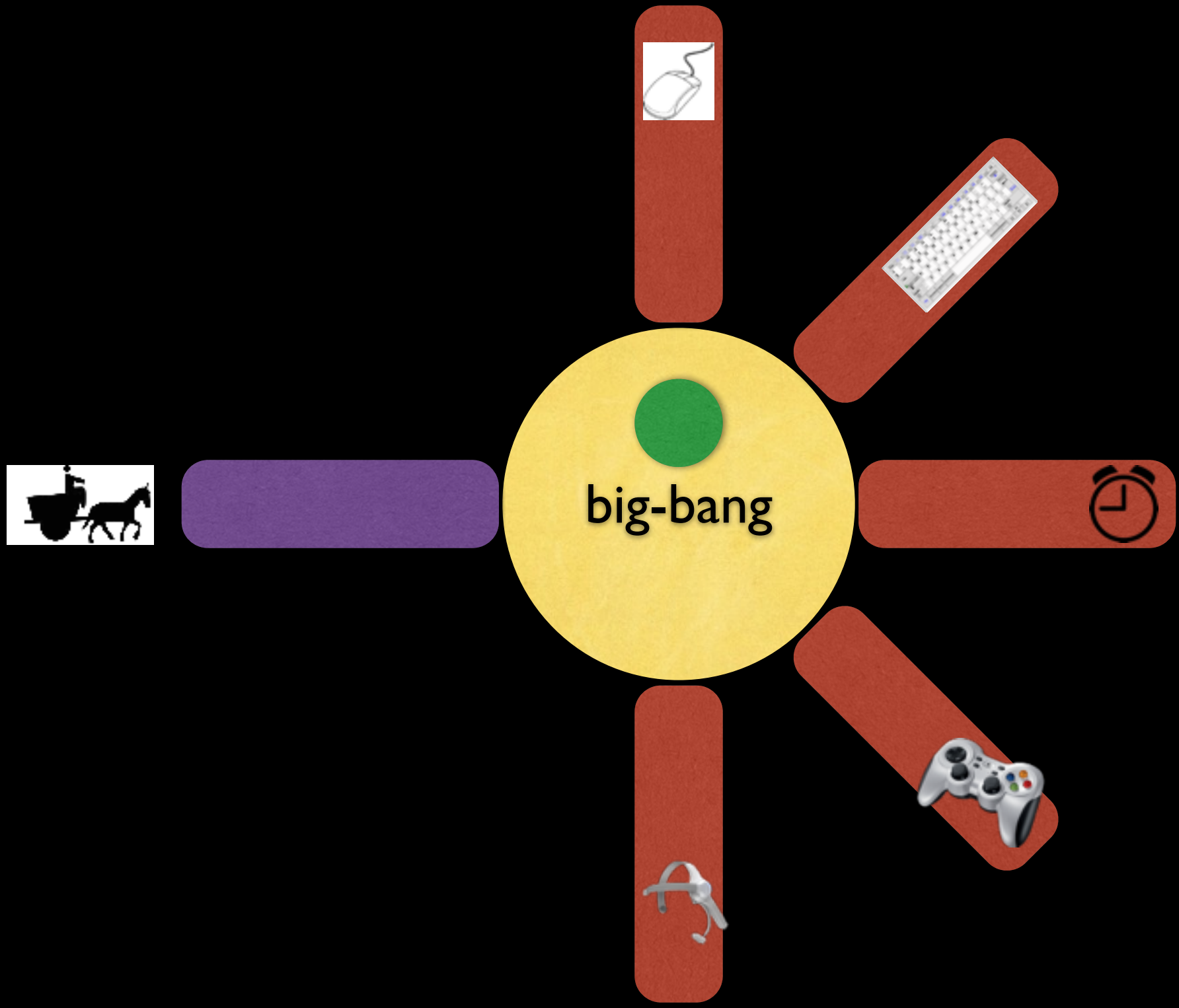
the programming for this world

— the pedagogy
— the *design* approach
— the teaching langs
— the educational IDE

demo: from numbers to images and movies

big-bang


a mini OS
the secret value
big-bang
externalize!
clock tick handler
event handlers


big-bang

describe a world declaratively

```
(big-bang State
  [to-draw   (State -> Image)]
  [on-tick   (State -> State)]
  [on-key    (State Key -> State)]
  [on-mouse  (State N N Mouse -> State)]
  [stop-when (State -> Boolean)]
  …)

type State  ; students' choice
```

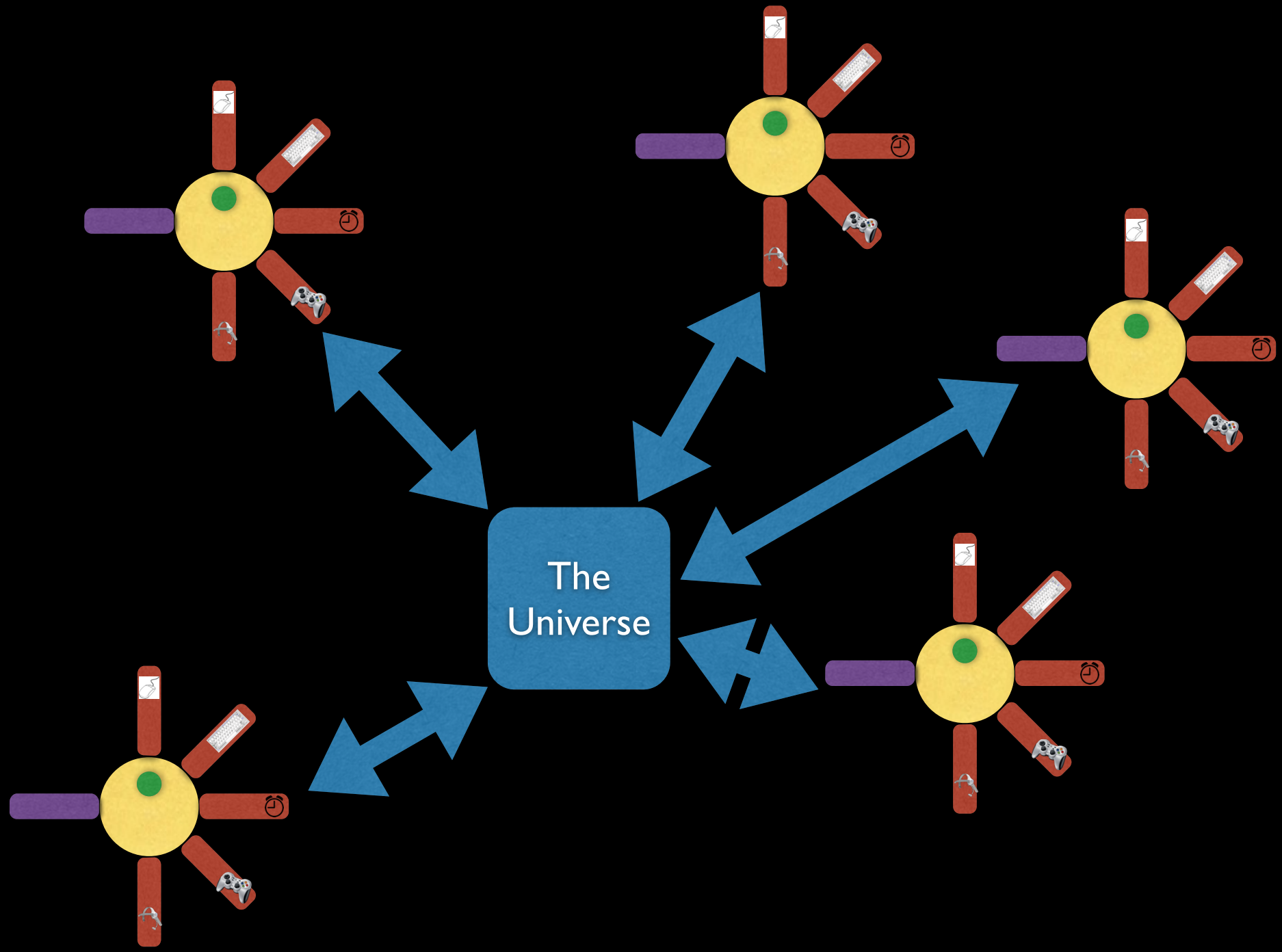
demo: big-bang

conditional functions

What is the value of sign for -3, 42, and 0?

$$\text{sign}(x) = \begin{cases} +1 \text{ if } x > 0 \\ 0 \text{ if } x = 0 \\ -1 \text{ if } x < 0 \end{cases}$$

universe,
the world is not enough


The
Universe

communicating worlds may send messages

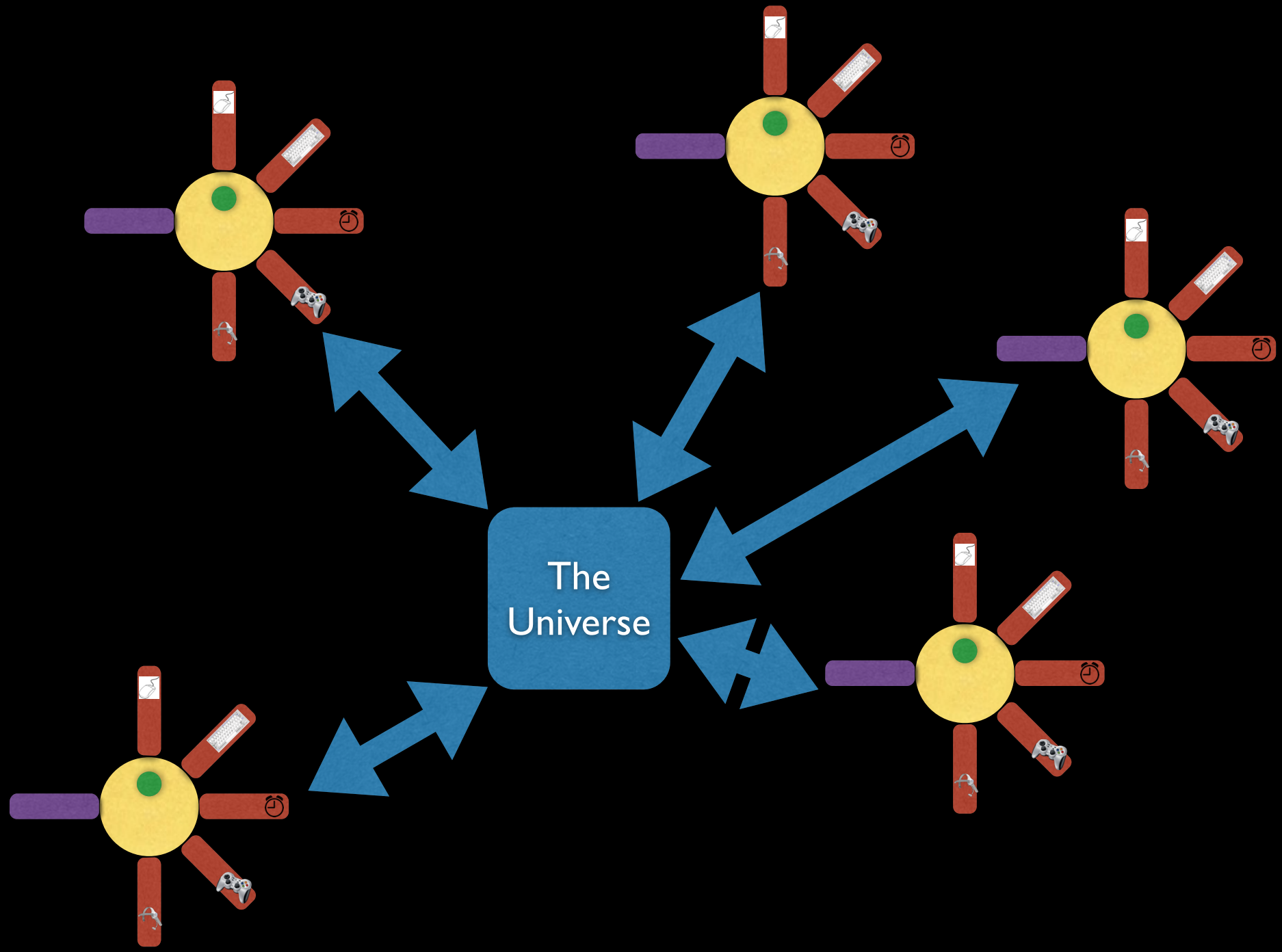
```
(big-bang State
  [to-draw    (State -> Image)]
  [on-tick    (State -> State x Message)]
  [on-key     (State Key -> State x Message)]
  [on-mouse   (State N N Mouse -> State x Message)]
  [on-receive (State Message -> State x Message)]
  [register   IP]
  [stop-when  (State -> Boolean)]
  …)

type Message  ; a serializable value
type IP       ; a representation of IP #s
```

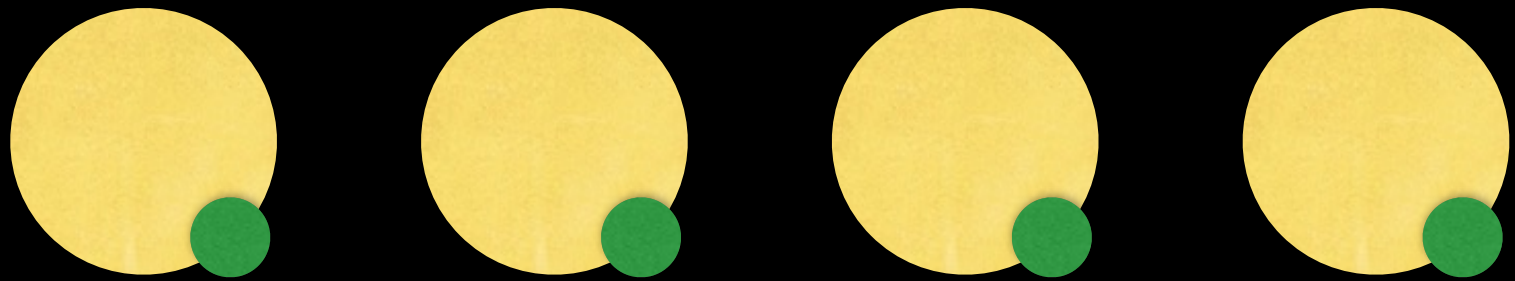
universe is a central message broker

```
(universe State
  [on-new (State IWorld          -> Bundle)]
  [on-msg (State IWorld Message -> Bundle)]
  …)

type State  ; students' choice
type IWorld ; representation of communicating world

type Bundle = State x [Mail] x [IWorld]
type Mail   = IWorld x Message
```

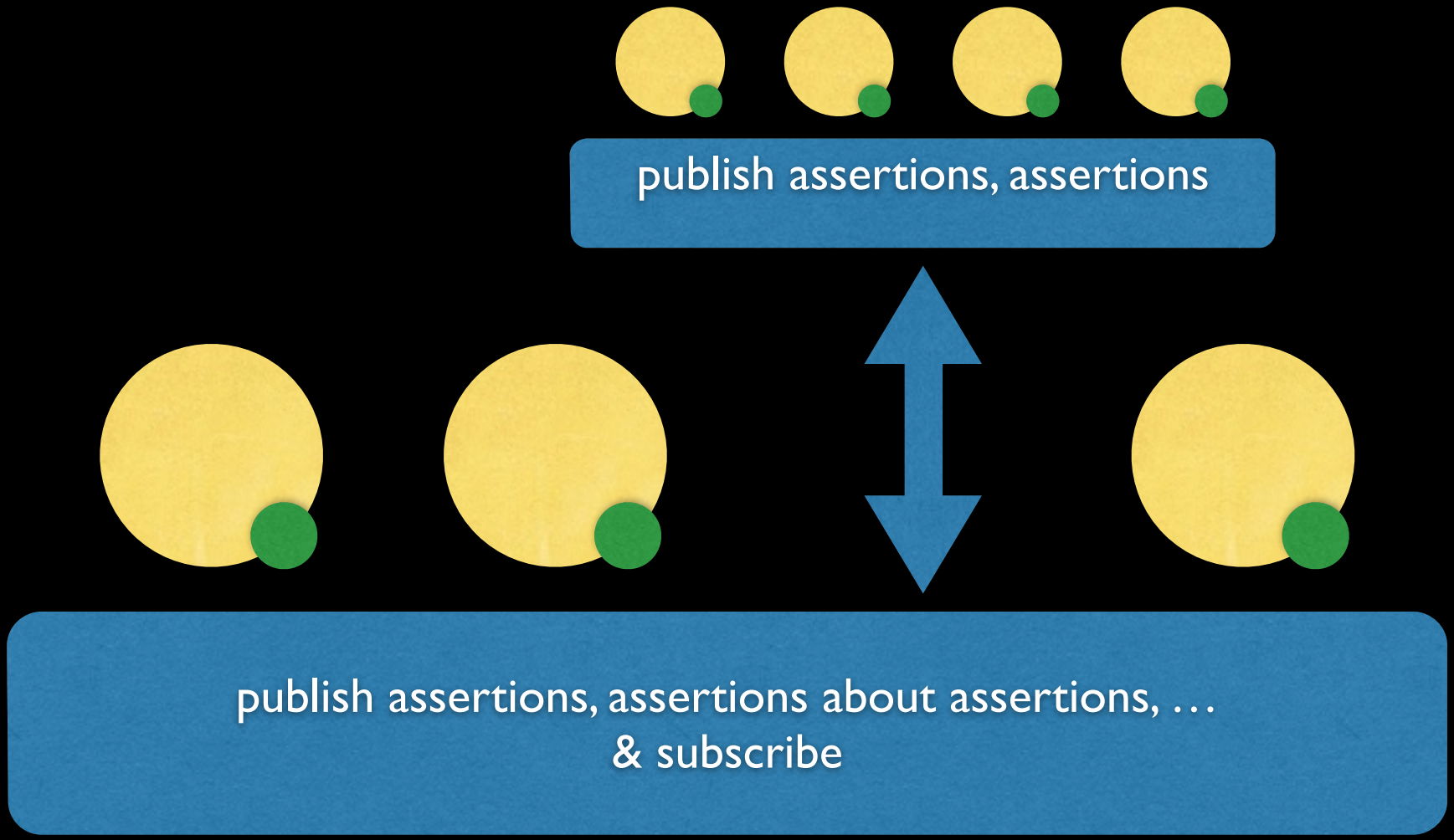
demo: communicating worlds

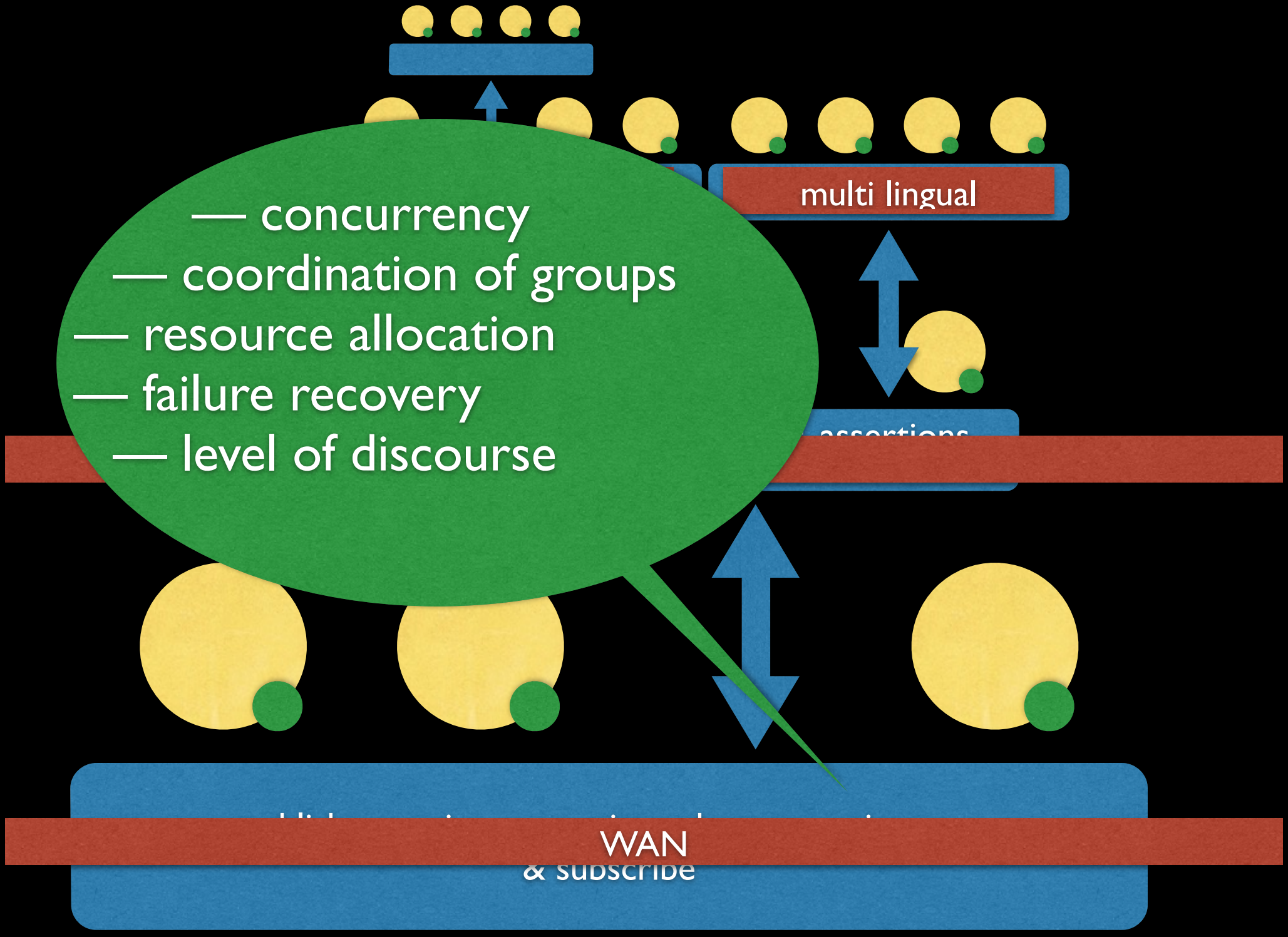
the network,
folding it into the language


The
Universe

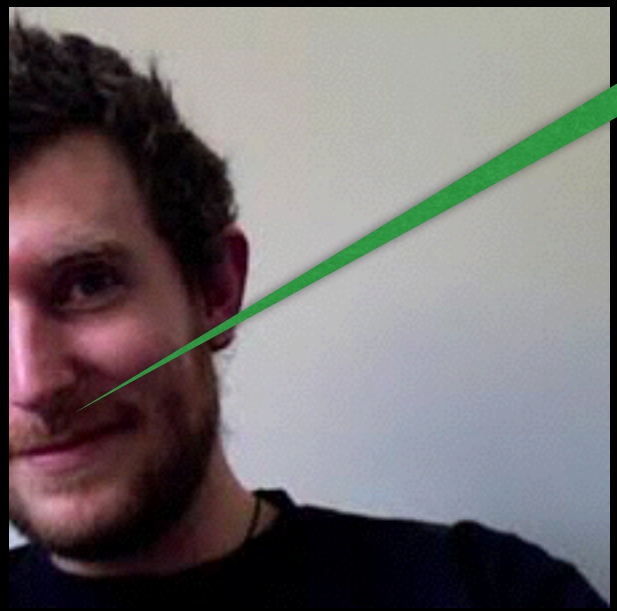


publish assertions, assertions about assertions, …
& subscribe


publish assertions, assertions
publish assertions, assertions about assertions, …
& subscribe

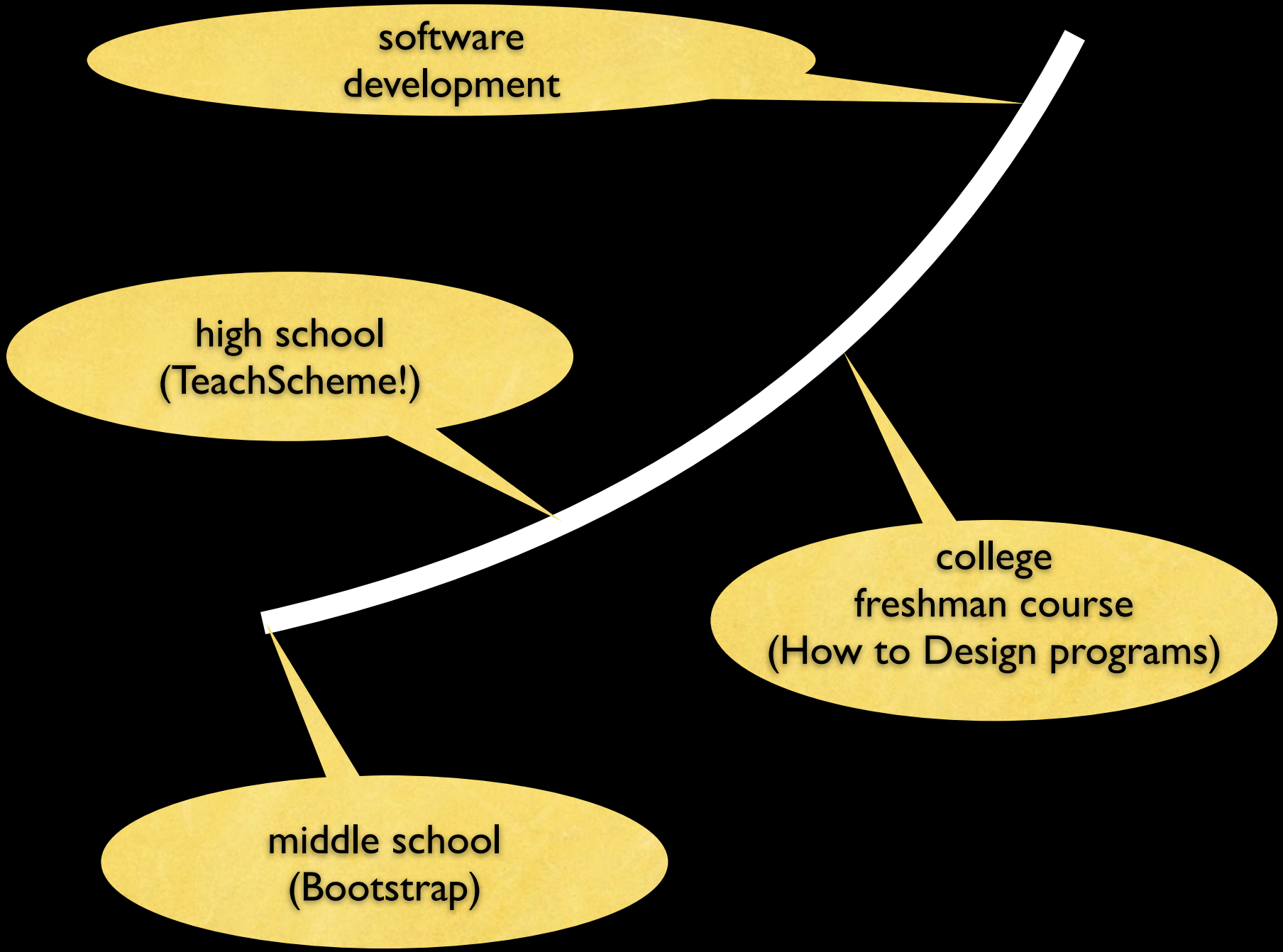

— concurrency
— coordination of groups
— resource allocation
— failure recovery
— level of discourse
multi lingual
WAN
& subscribe

More to come in my dissertation.



Tony Garnock-Jones

take away


software
development
high school
(TeachScheme!)
college
freshman course
(How to Design programs)
middle school
(Bootstrap)

the end