Reactive Systems

Drugs → Code

Dr. Jonathan Graham
8th Light

@GRAHAM_dp
DRUGS!
MORE DRUGS

DRUGS
REACTIVE MANIFESTO

- Responsive
- Elastic
- Resilient
- Message Driven
DRUGS!
pharmacist falling off ladder
Little's Law

\[ L = \lambda W \]

- Concurrent Requests
- Arrival Rate
- Time Spent
LITTLE'S LAW

\[ L = \lambda W \]

- Concurrent Requests
- Arrival Rate
- Time Spent

\[ \lambda = \frac{10}{4} \]
\[ W = 0.14 \]
\[ \Rightarrow L = 1 \]

\[ \lambda = \frac{50}{4} \]
\[ W = 0.14 \]
\[ \Rightarrow L = 5 \]

or

\[ \lambda = \frac{50}{4} \]
\[ W = 0.024 \]
\[ \Rightarrow L = 1 \]
REACTIVE SYSTEMS

LITTLE'S LAW

\[ L = \frac{\lambda W}{2} \]

- Concurrent Requests
- Arrival Rate
- Time Spent

RESPONSIVE

ELASTIC

RESILIENT

MESSAGE DRIVEN
STUFF
SIDE EFFECTS
STUFF

ORDER INPUTS → ANALYSE INPUTS → RELEASE INPUTS → PREPARE EQUIPMENT → REACTION → ANALYSE OUTPUT → RELEASE OUTPUT → CLEAN EQUIPMENT → SHIP OUTPUT
triangle of throughput, quality and cost
Quality By Design
Move to a more functional approach – show collection of parameters going into a reaction function, and a collection of outputs.

Input Parameters

Referential Transparency

Reaction

No Side Effects

Output Parameters
Quality by Design

Move to a more functional approach – show collection of parameters going into a reaction function, and a collection of outputs.

Do as code?

TIGHT COUPLING

FLEXIBILITY
THINK IN STREAMS
INPUT 1 → MIX → MERGED STREAM

INPUT 1
INPUT 2

MERGE FUNCTION

OUTPUT
A → MIX → Rxn1 → FILTER → Rxn2 → OUT

A
B
MERGED
CRUDE
CLEAN
OUT
SAMPLES

RESULTS

SWITCH
SAMPLES

RESULTS

SWITCH
Slide as before, but include a filter and pressure gauge.
DRUGS!
RESPONSIVE

FLOW

RESILIENT

MESSAGE DRIVEN

ELASTIC
Reactive Design Patterns
- Roland Kuhn
- Jamie Allen

https://www.manning.com/books/reactive-design-patterns

The Introduction To Reactive Programming
You've Been Missing
- Andre Staltz

https://gist.github.com/staltz/868e7e9bc2a7b8c1f754
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