Erlang Patterns Matching Business Needs

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& Idioms

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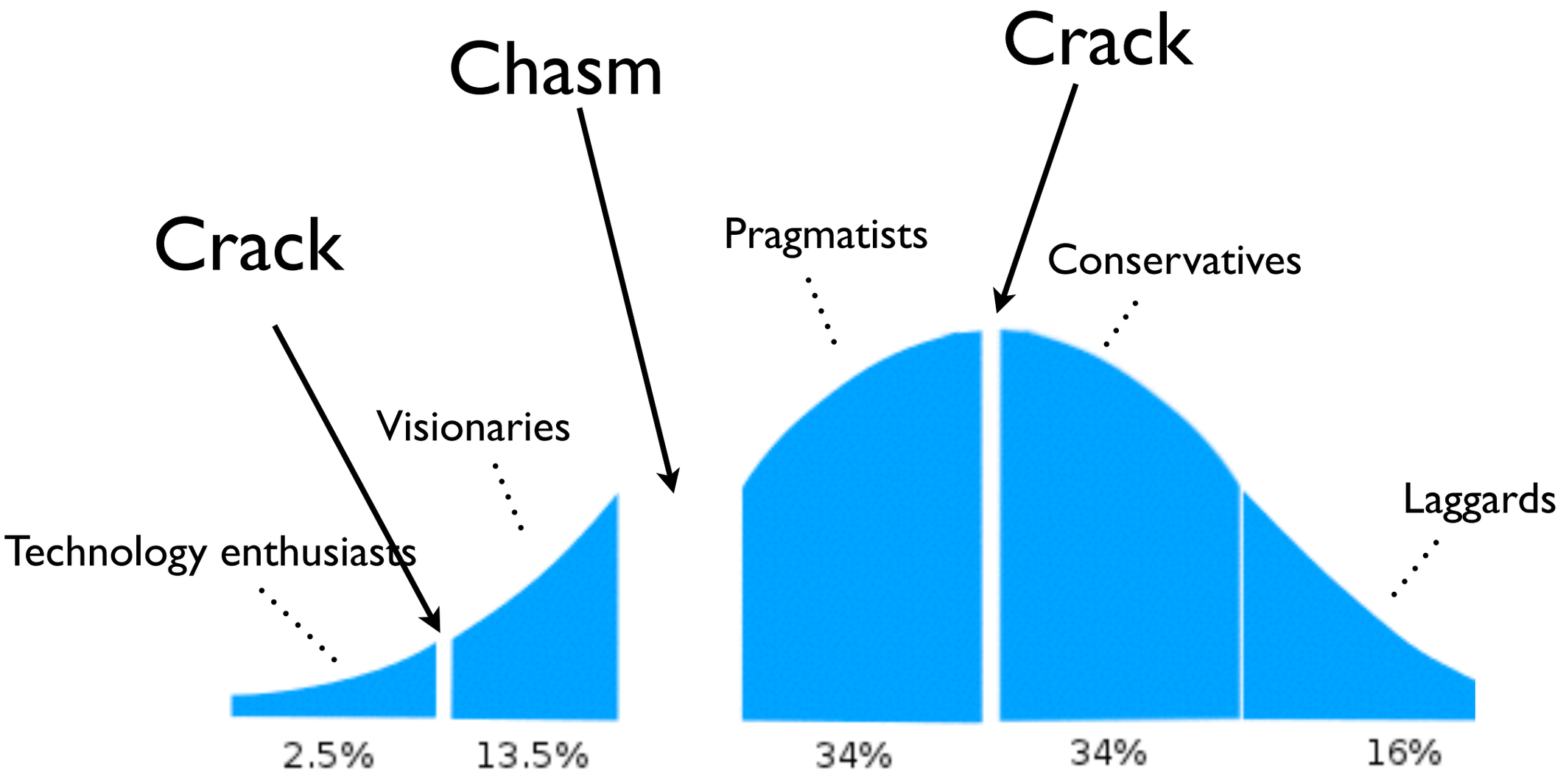
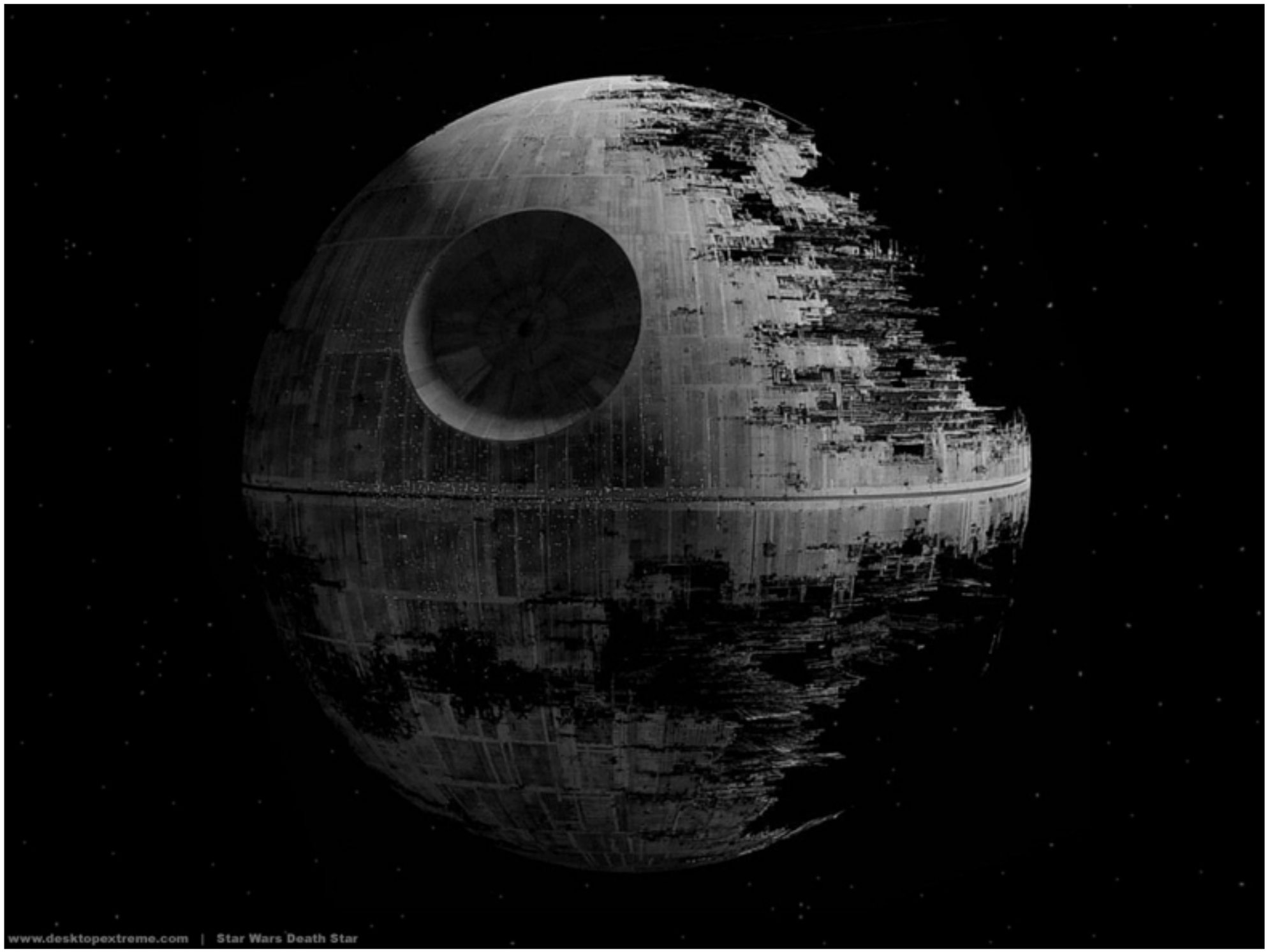
Cracks and a Chasm



To cross the chasm you must talk business value!

Enterprise Software



http://kesseljunkie.files.wordpress.com/2011/06/star_wars_death_star_38200545907pm743.jpg

What Killed the Death Star?

What Killed the Death Star?

`PowerShieldBreakdownException`

What Killed the Death Star?

```
PowerShieldBreakdownException

SurfaceWithAlleysDesignException
```

What Killed the Death Star?

```
PowerShieldBreakdownException

SurfaceWithAlleysDesignException

MissileEnteredUnprotecedVentilationShaftException
```

Expect resistance…

Source: http://2.bp.blogspot.com/-qNM3LGTtUYM/UIFLJGd_MLI/AAAAAAAAAnU/GCtI5SYfbCs/s320/orc-army.jpg

source: http://images1.wikia.nocookie.net/__cb20110119125642/villains/images/e/ef/Saruman.jpg

source: http://asset3.cbsistatic.com/cnwk.1d/i/tim2/2013/08/12/Larry_Ellison_Oracle_Open_World_2009_610x407.jpg

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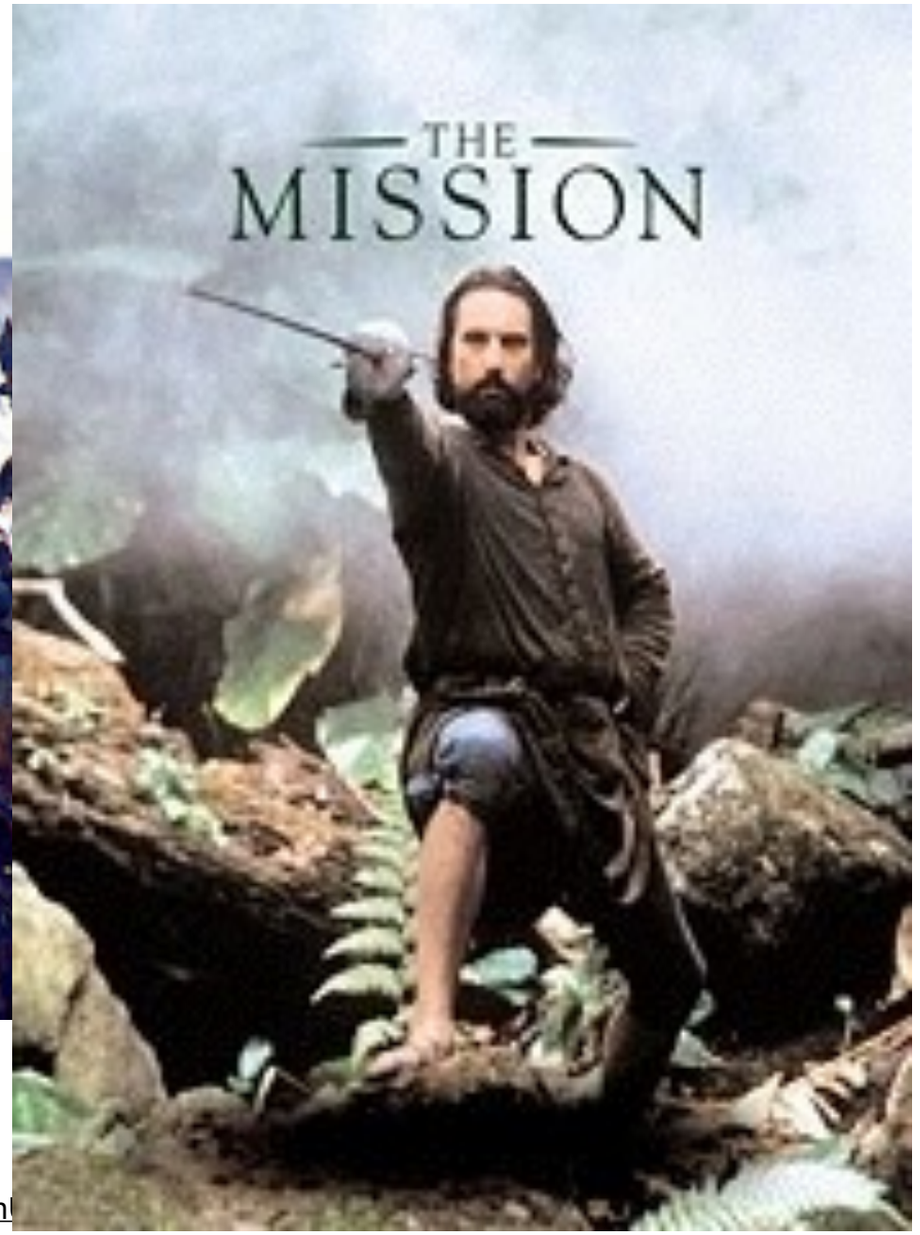

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source: http://www.rottentomatoes.com/m/1014027-mission/

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source: http://asset3.cbsistatic.com/cnwk.1d/i/tim2/2013/08/12/Larry_Ellison_Oracle_Open_World_2009_610x407.jpg

Citius, Altius, Fortius

Olympic Motto

Citius, Altius, Fortius

Citius, Maior, Vilius

Business Imperative

Citius, Maior, Vilius

Everlasting Software Requirements

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speed to market

Everlasting Software Requirements

speed to market

reliable

Everlasting Software Requirements

speed to market

reliable

scalable

Everlasting Software Requirements

speed to market

reliable

scalable

maintainable

Agile Manifesto

Agile Manifesto

Individuals and interactions > Processes and tools

Agile Manifesto

Individuals and interactions > Processes and tools

Working software > Comprehensive documentation

Agile Manifesto

Individuals and interactions > Processes and tools

Working software > Comprehensive documentation

Customer collaboration > Contract negotiation

Agile Manifesto

Individuals and interactions > Processes and tools

Working software > Comprehensive documentation

Customer collaboration > Contract negotiation

Responding to change > Following a plan

Software Architecture

Separation of concerns

Quality-driven

Recurring styles

Conceptual integrity

Erlang History

There are two ways of constructing a software design:

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One way is to make it so simple that there are *obviously* no deficiencies…

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One way is to make it so simple that there are *obviously* no deficiencies…
… and the other way is to make it so complicated that there are no *obvious* deficiencies.

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One way is to make it so simple that there are *obviously* no deficiencies…
… and the other way is to make it so complicated that there are no *obvious* deficiencies.

- C.A.R. Hoare

Erlang's Original Requirements

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Large scale concurrency

Erlang's Original Requirements

Large scale concurrency

Soft real-time

Erlang's Original Requirements

Large scale concurrency

Soft real-time

Distributed systems

Erlang's Original Requirements

Large scale concurrency

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Hardware interaction

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Hardware interaction

Very large software systems

Complex functionality

Continuous operation for many years

Software maintenance on-the-fly

High quality and reliability

Fault tolerance

Bjarne Däcker's Licentiate Thesis: http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.88.1957

wanted

wanted

productivity

wanted

productivity

no down-time

wanted

productivity

no down-time

something that always works

wanted

wanted

money

wanted

money

money

wanted

money

money

money

wanted

money

money

money

it’s a rich man’s world!

wanted

money

money

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it’s a rich man’s world!

If our basic tool, the language in which we design and code our programs, is also complicated, the language itself becomes part of the problem rather than part of its solution.

- C.A.R. Hoare

Good Erlang Domains

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Low latency over throughput

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Stateful (in contrast to being stateless)

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Uses OTP

Non-stop operation

Good Erlang Domains

Low latency over throughput

Stateful (in contrast to being stateless)

Massively concurrent

Distributed

Fault tolerant

Uses OTP

Non-stop operation

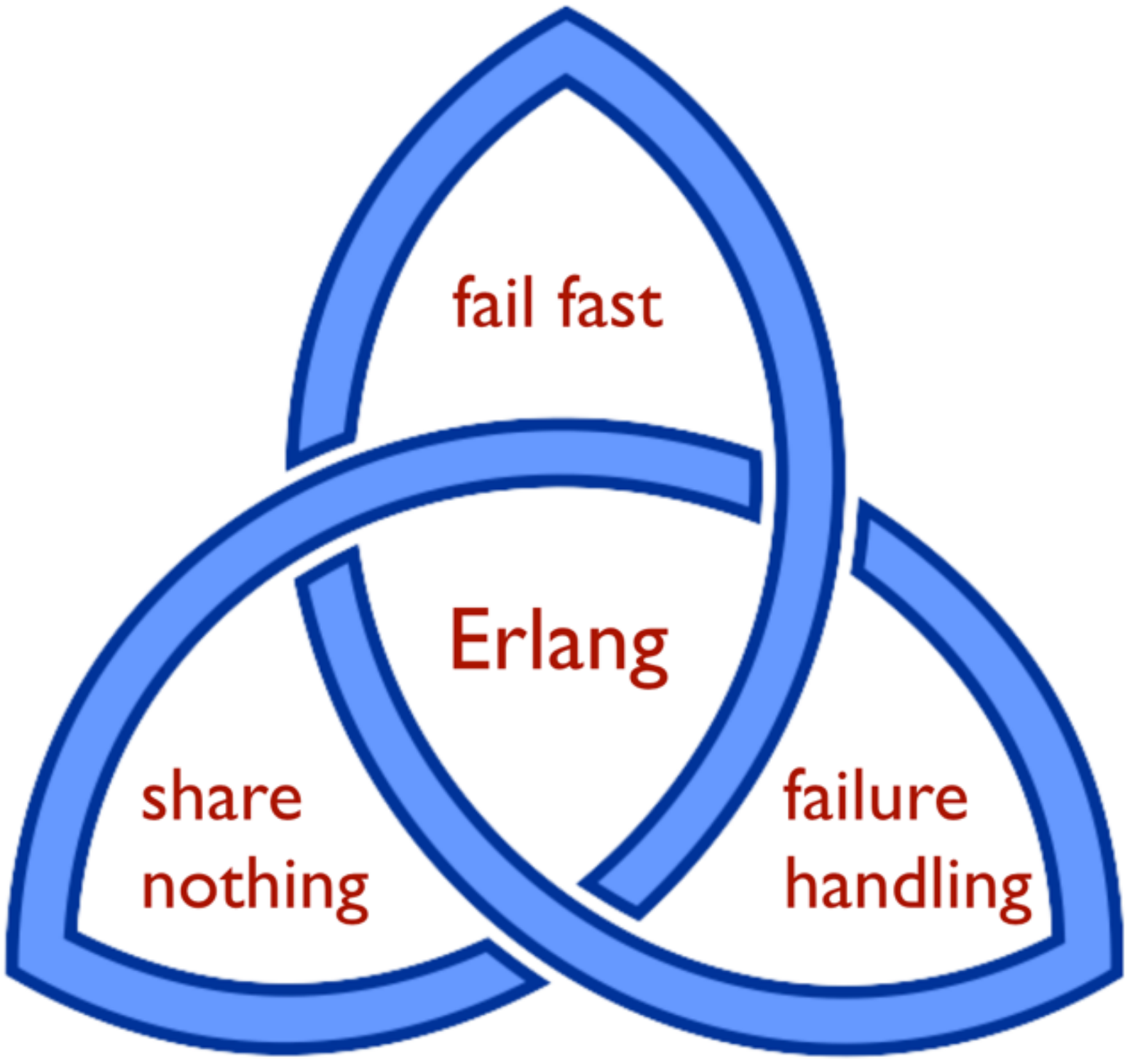
Under load, Erlang programs usually performs as well as programs in other languages, often way better.

Jesper Louis Andersen

The glove fits!

	Low latency	Stateful	Massively concurrent	Distributed	Fault tolerant
Messaging	✓	✓	✓	✓	✓
Webservers	✓	✓	✓		✓
Soft switches	✓	✓	✓	✓	✓
Distributed DBs	✓	✓	✓	✓	✓
Queueing systems	✓	✓	✓	✓	✓

The Golden Trinity Of Erlang



To Share Or Not To Share

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Memory

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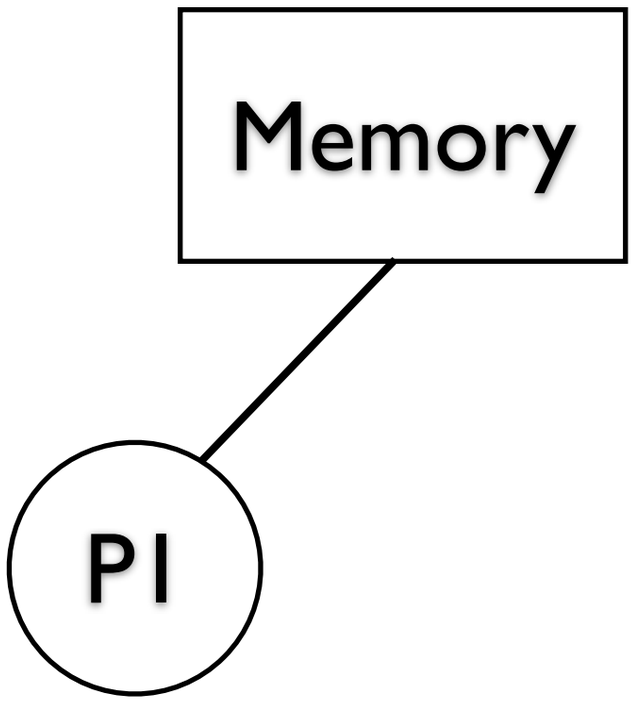

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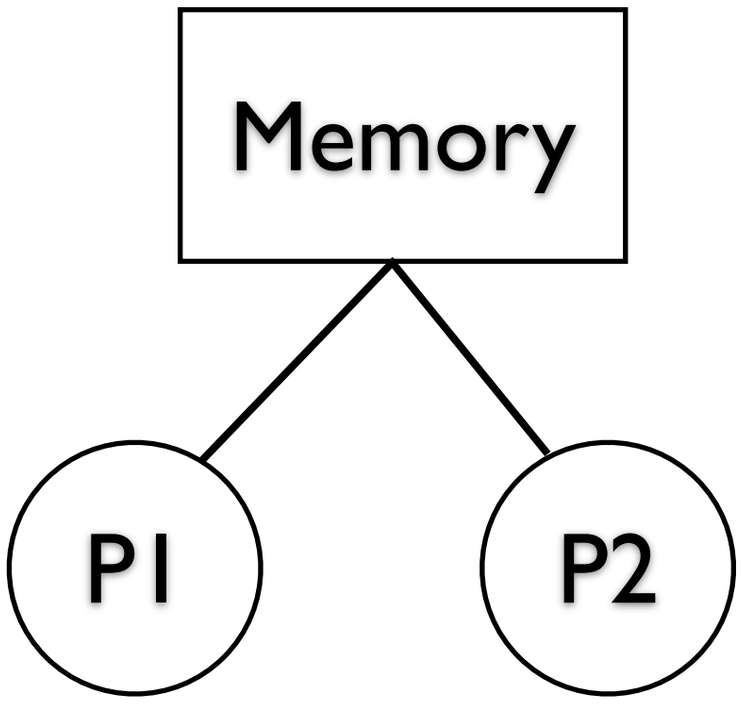

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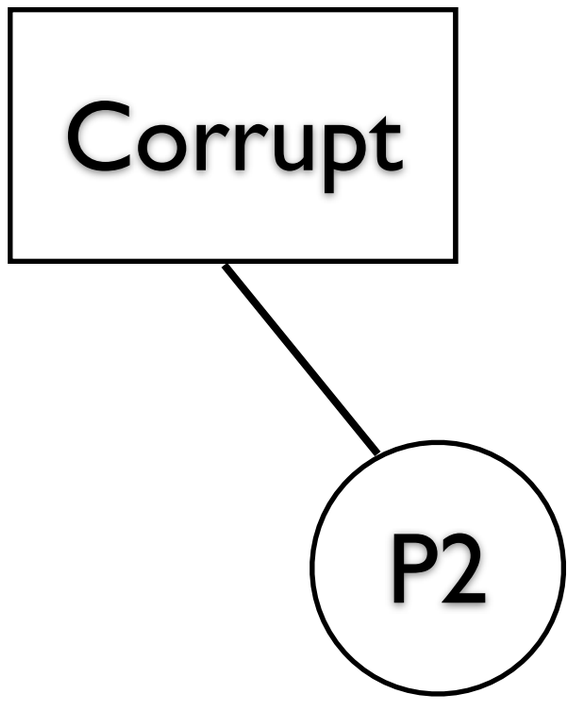

To Share Or Not To Share

Corrupt

To Share Or Not To Share

Corrupt

Memory

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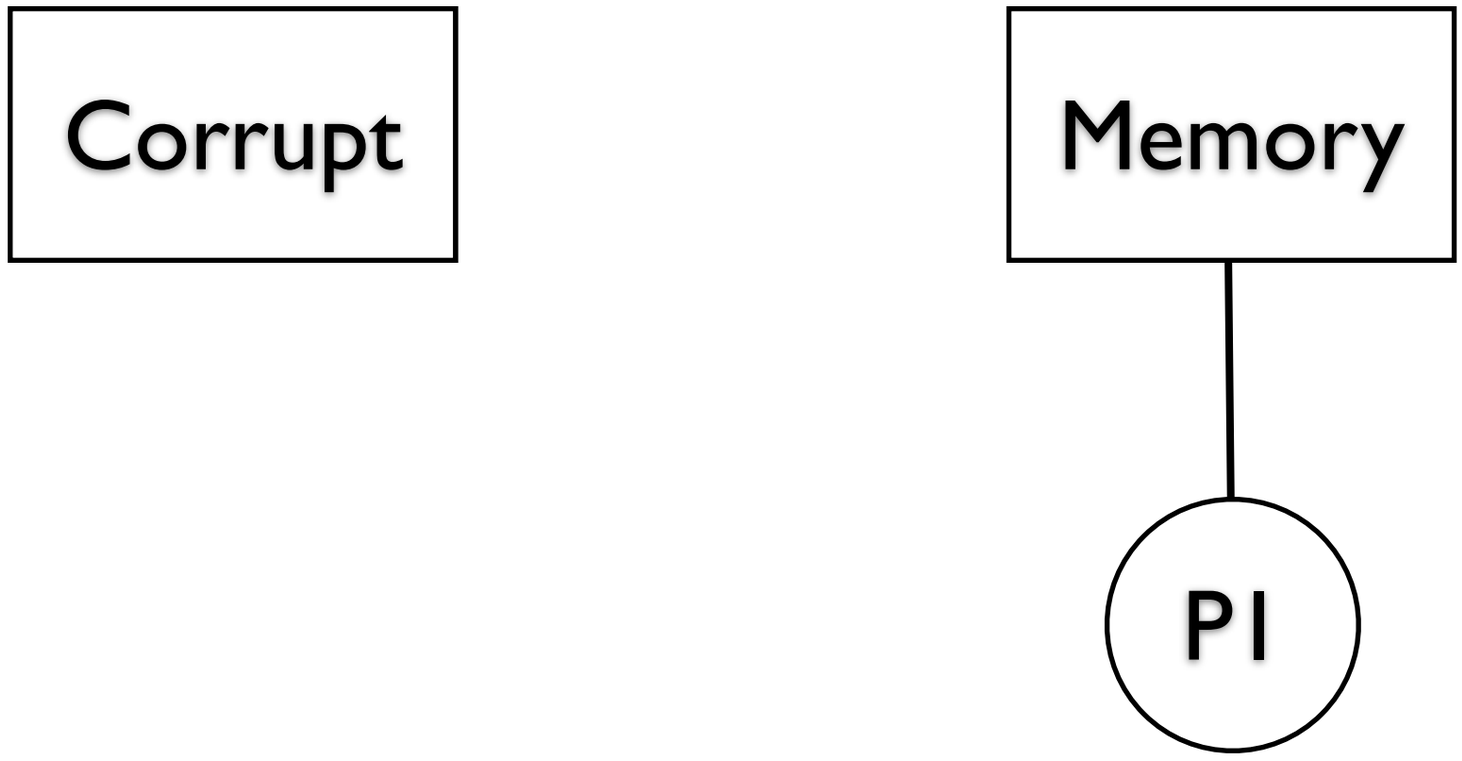

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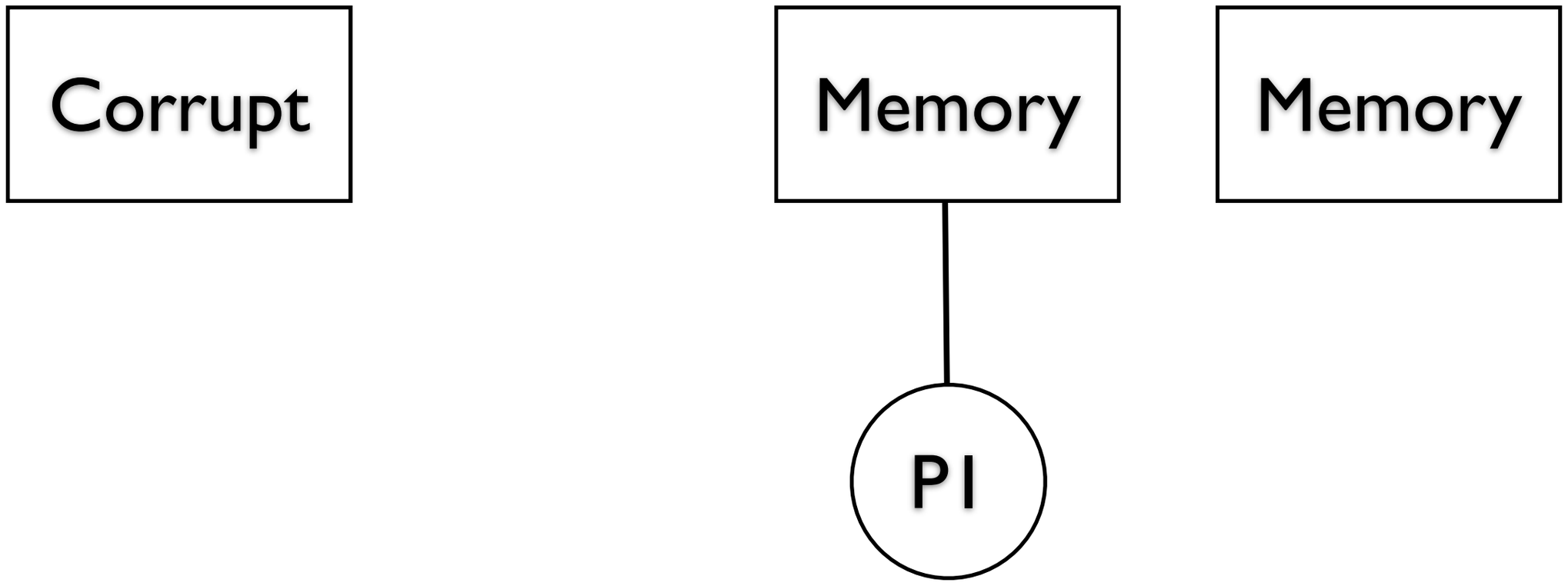

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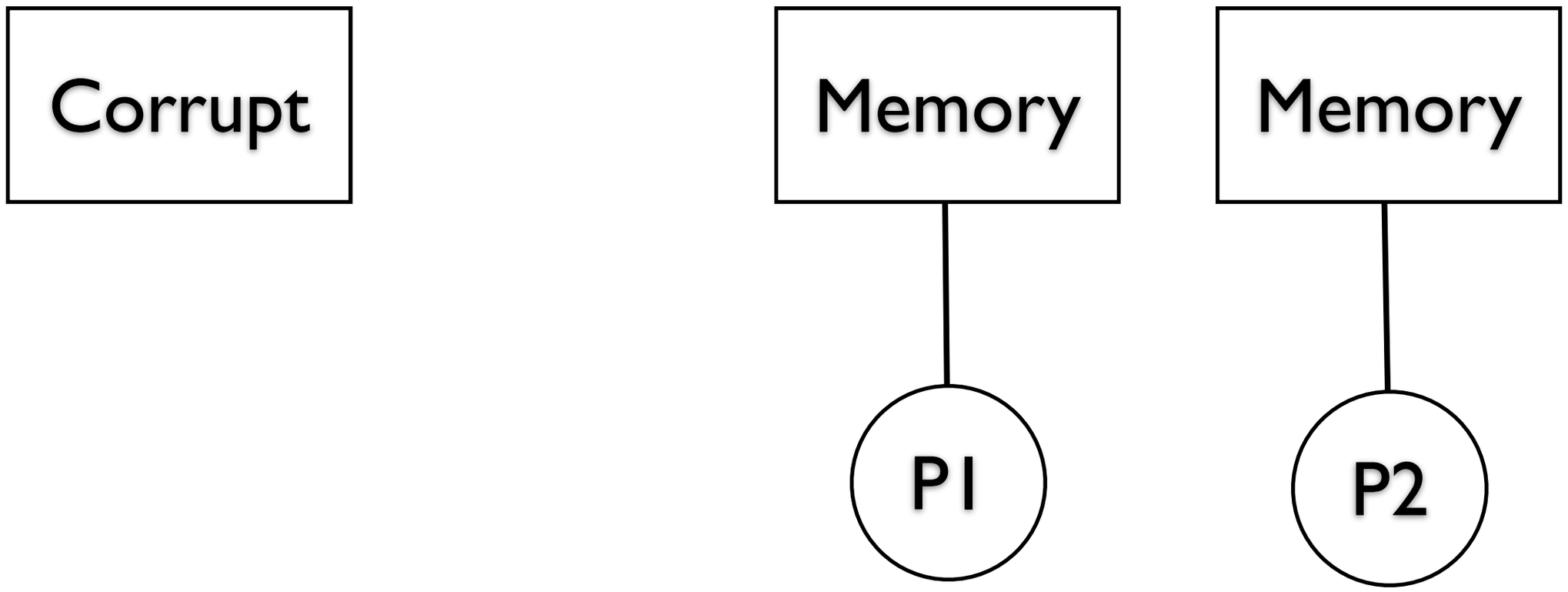

To Share Or Not To Share

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Failures

Anything that can go wrong,
will go wrong

Murphy

Failures

Programming errors

Anything that can go wrong,
will go wrong

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Disk failures

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Most programming paradigmes are
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Erlang is *fault tolerant* by design

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Erlang is *fault tolerant* by design
 ⇒ failures are embraced and

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source: http://www.thelmagazine.com/BrooklynAbridged/archives/2013/05/14/should-we-be-worried-about-this-brooklyn-measles-outbreak

source: http://johnkreng.wordpress.com/tag/jean-claude-van-damme/

Let It Fail

```
convert(monday)    -> 1;
convert(tuesday)   -> 2;
convert(wednesday) -> 3;
convert(thursday)  -> 4;
convert(friday)    -> 5;
convert(saturday)  -> 6;
convert(sunday)    -> 7;
convert(_) ->
    {error, unknown_day}.
```

Let It Fail

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convert(monday)    -> 1;
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```

Erlang encourages offensive programming

Intentional Programming

a style of programming where the reader of a program can easily see what the programmer intended by their code. [1]

[1] http://www.erlang.org/download/armstrong_thesis_2003.pdf

Intentional Dictionary

data retrieval - `dict:fetch(Key, Dict) = Val | EXIT`

the programmer knows a specific key should be in the dictionary and it is an error if it is not.

search - `dict:find(Key, Dict) = {ok, Val} | error.`

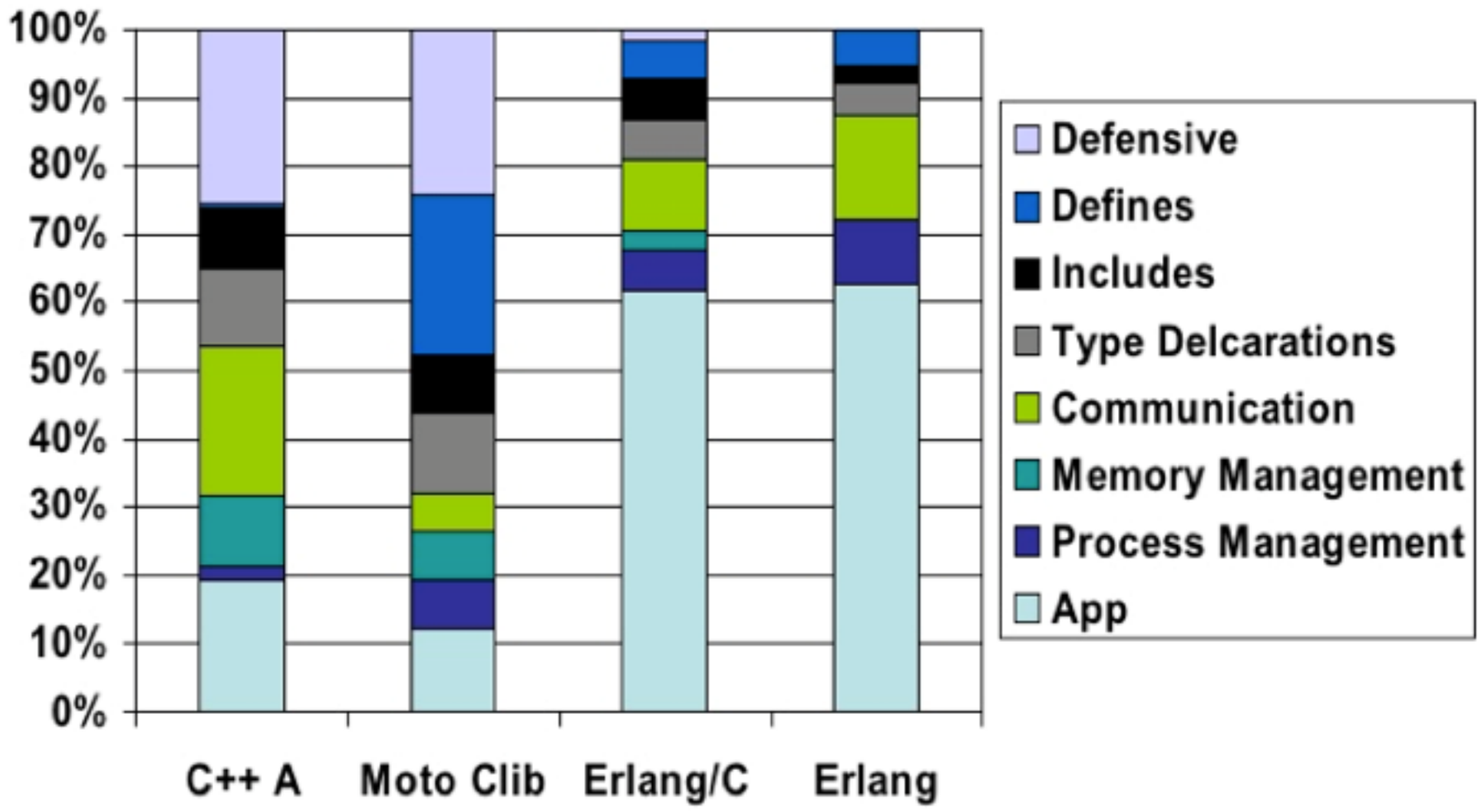
it is unknown if the key is there or not and both cases must be dealt with.

test - `dict:is_key(Key, Dict) = Boolean`

knowing if a key is present is enough.

Benefits of let-it-fail

Data Mobility component breakdown



Source: http://www.slideshare.net/JanHenryNystrom/productivity-gains-in-erlang

Benefits of let-it-fail

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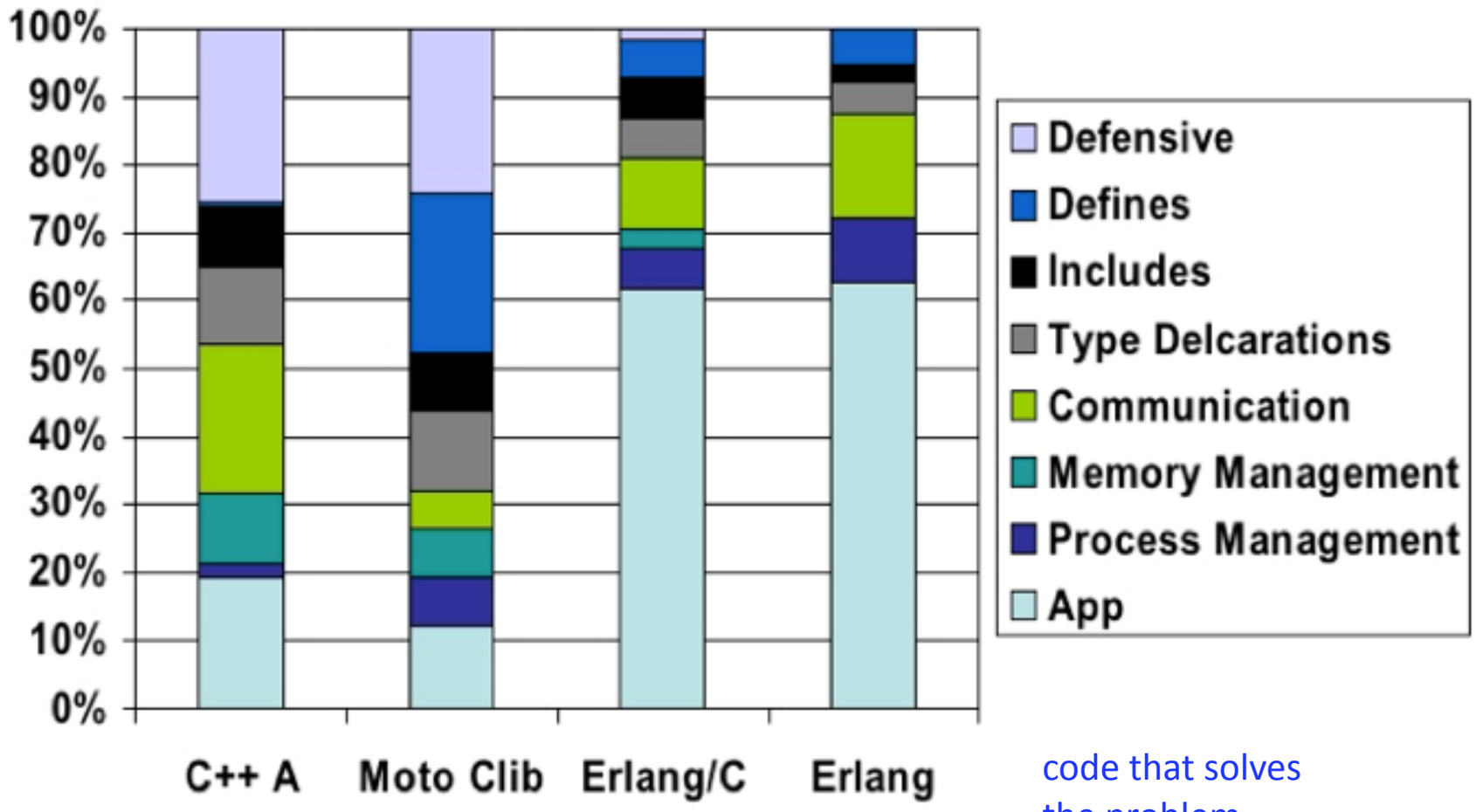

code that solves the problem

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Benefits of let-it-fail

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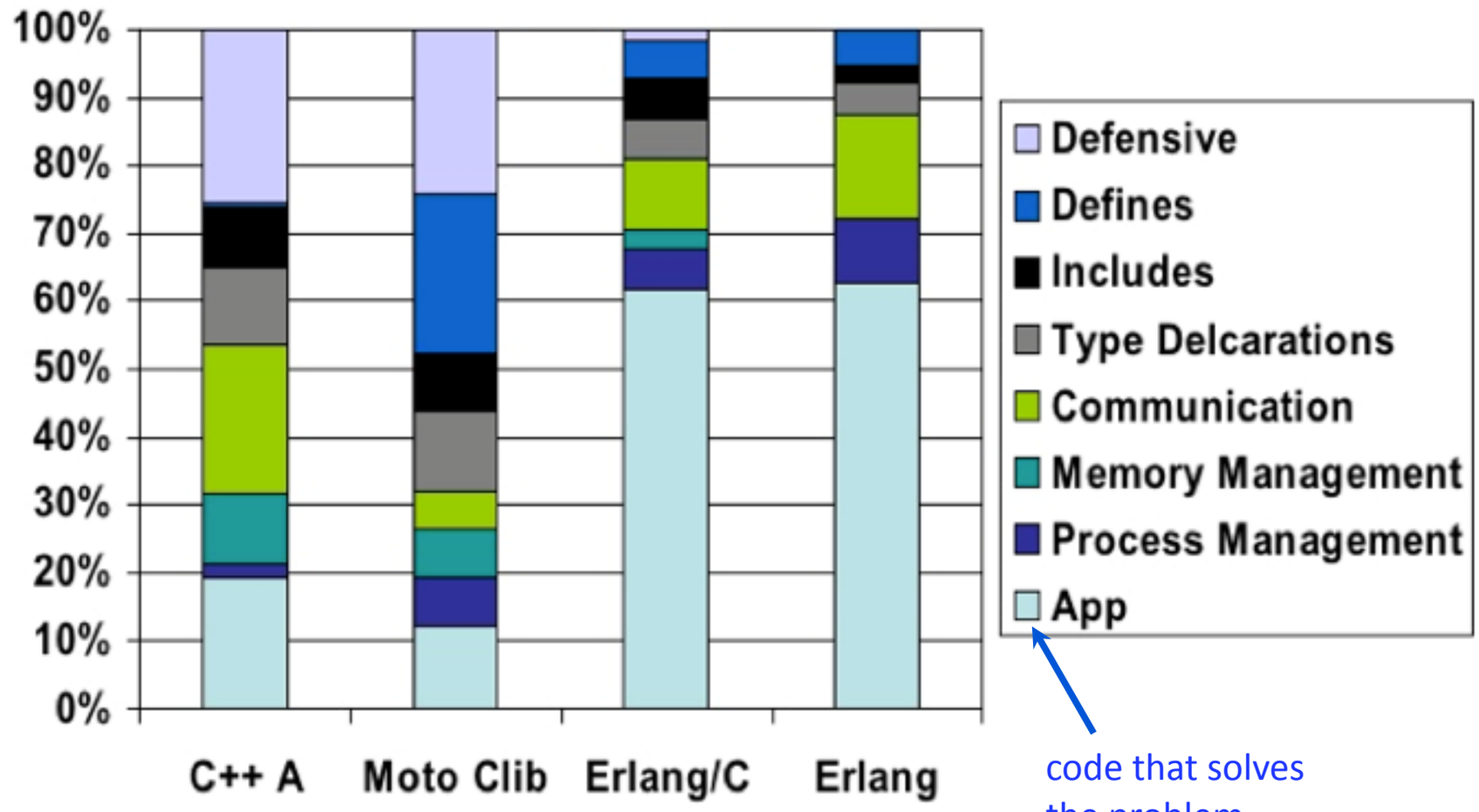

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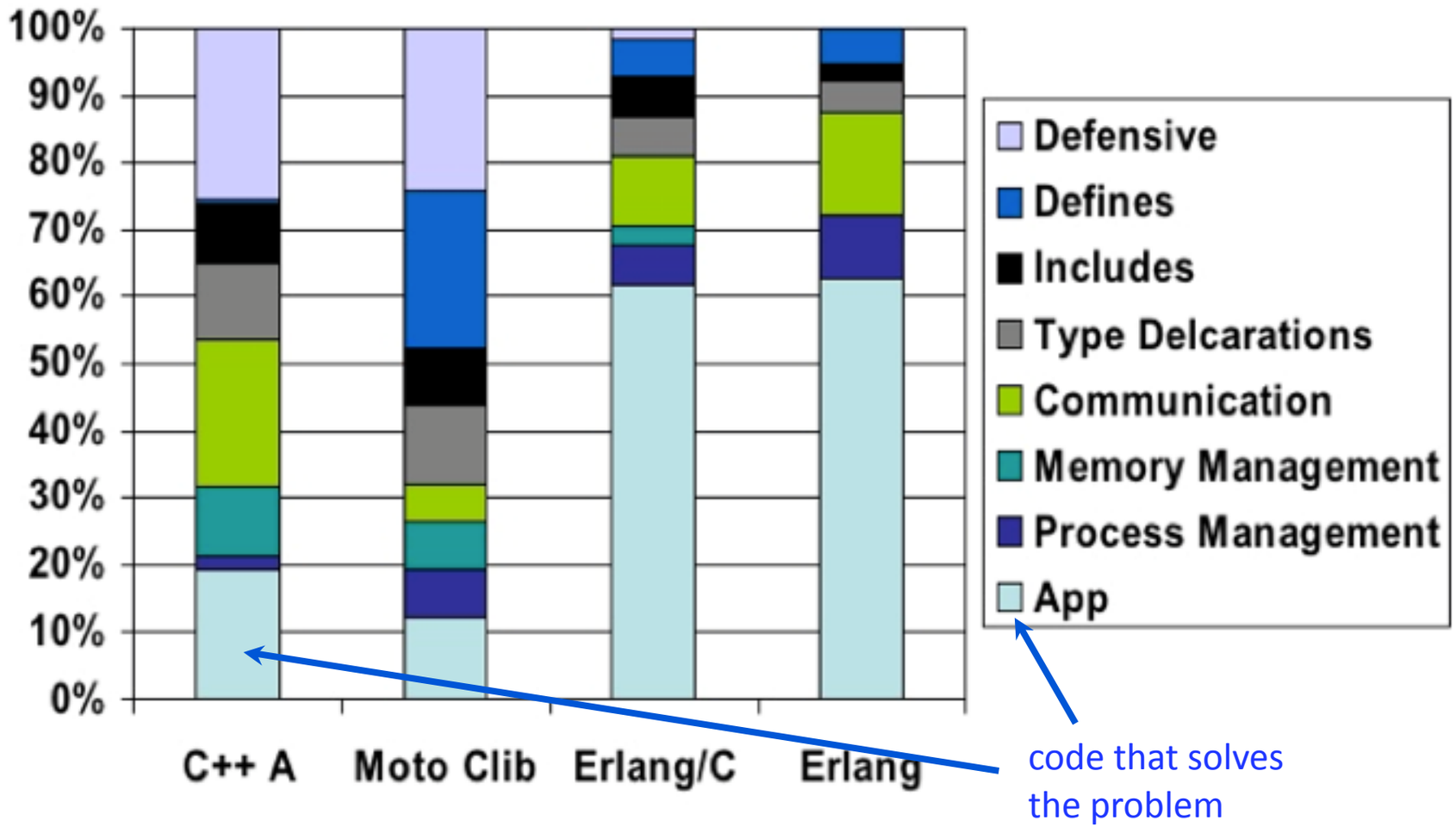

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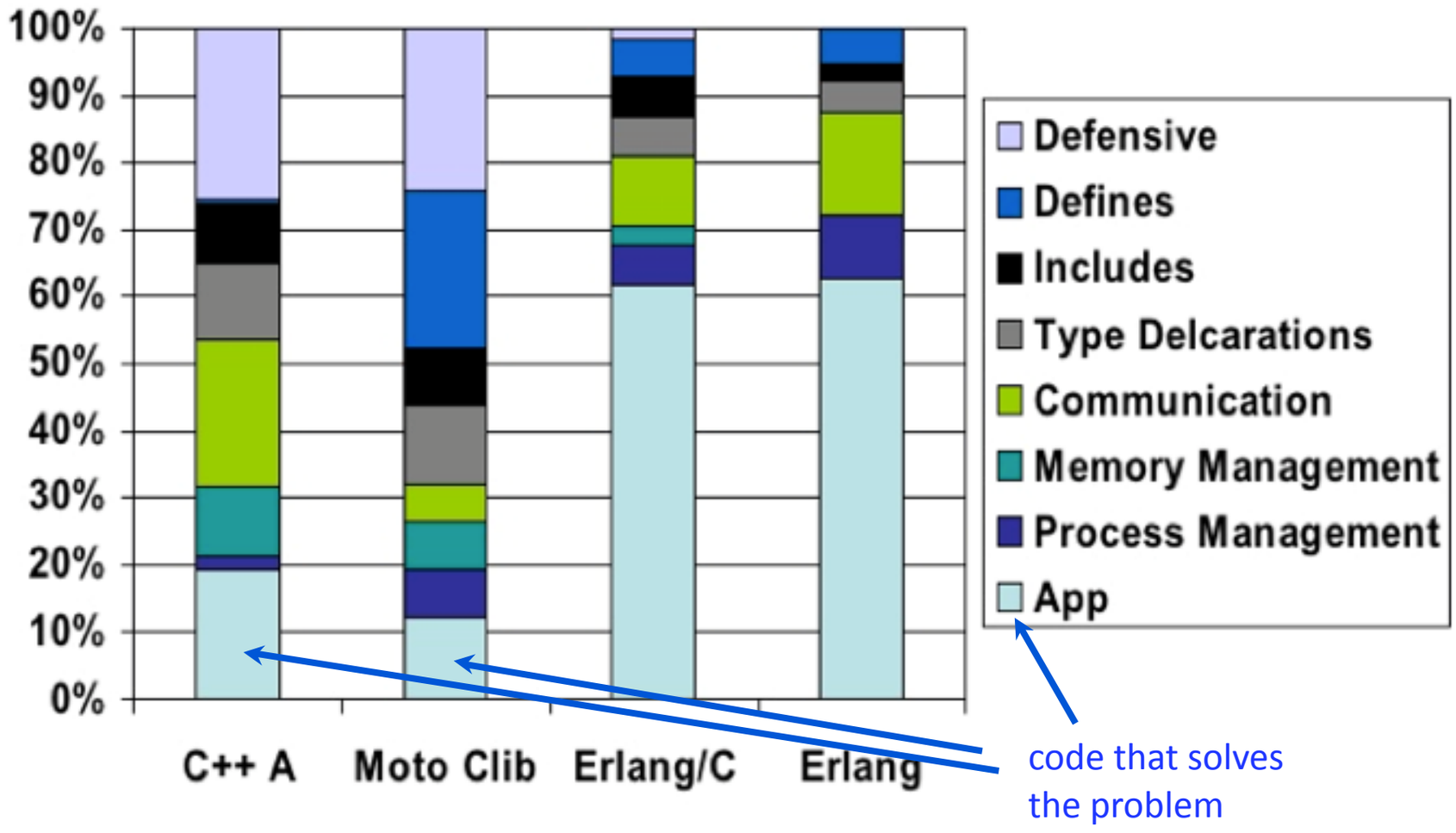

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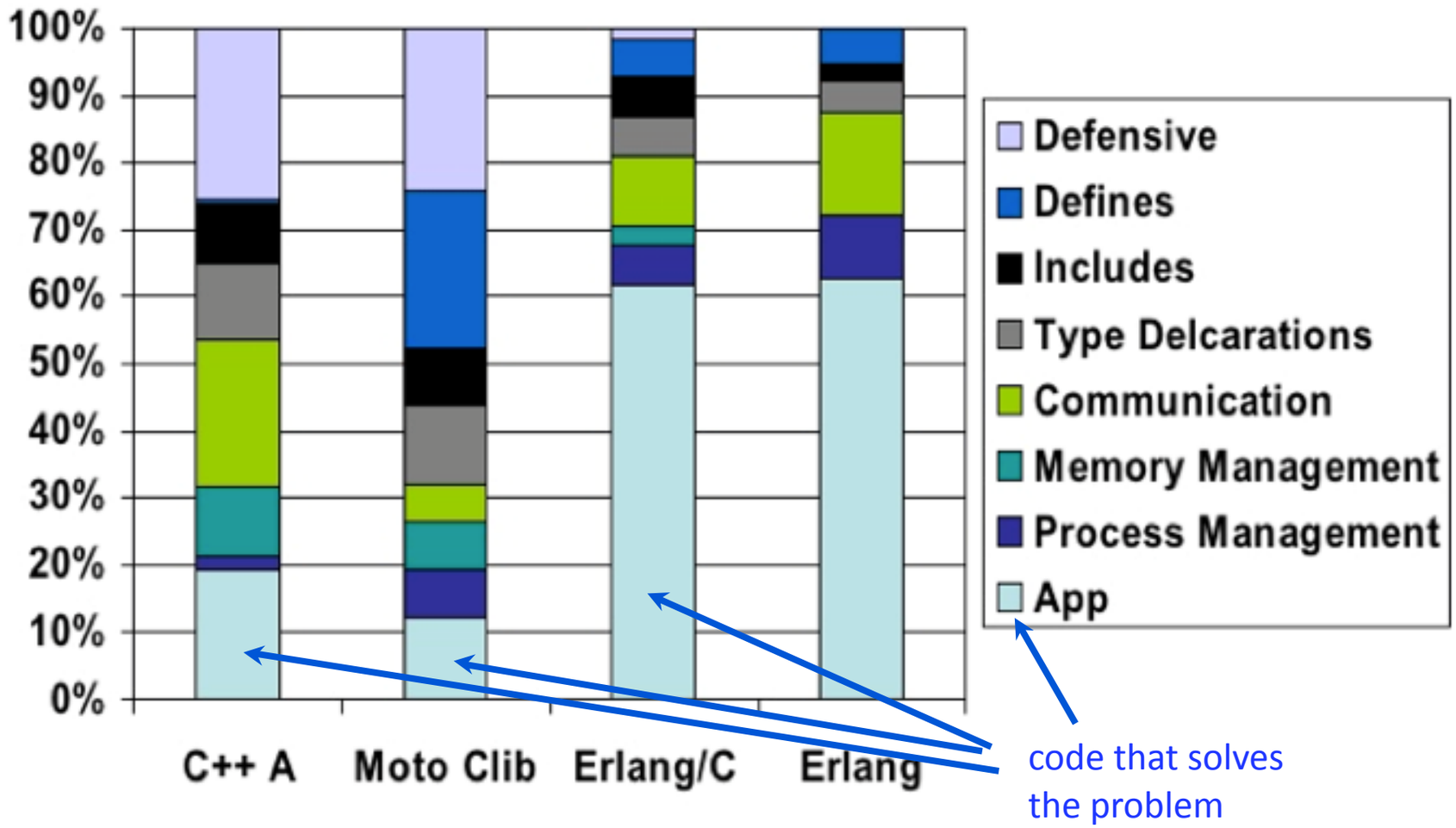

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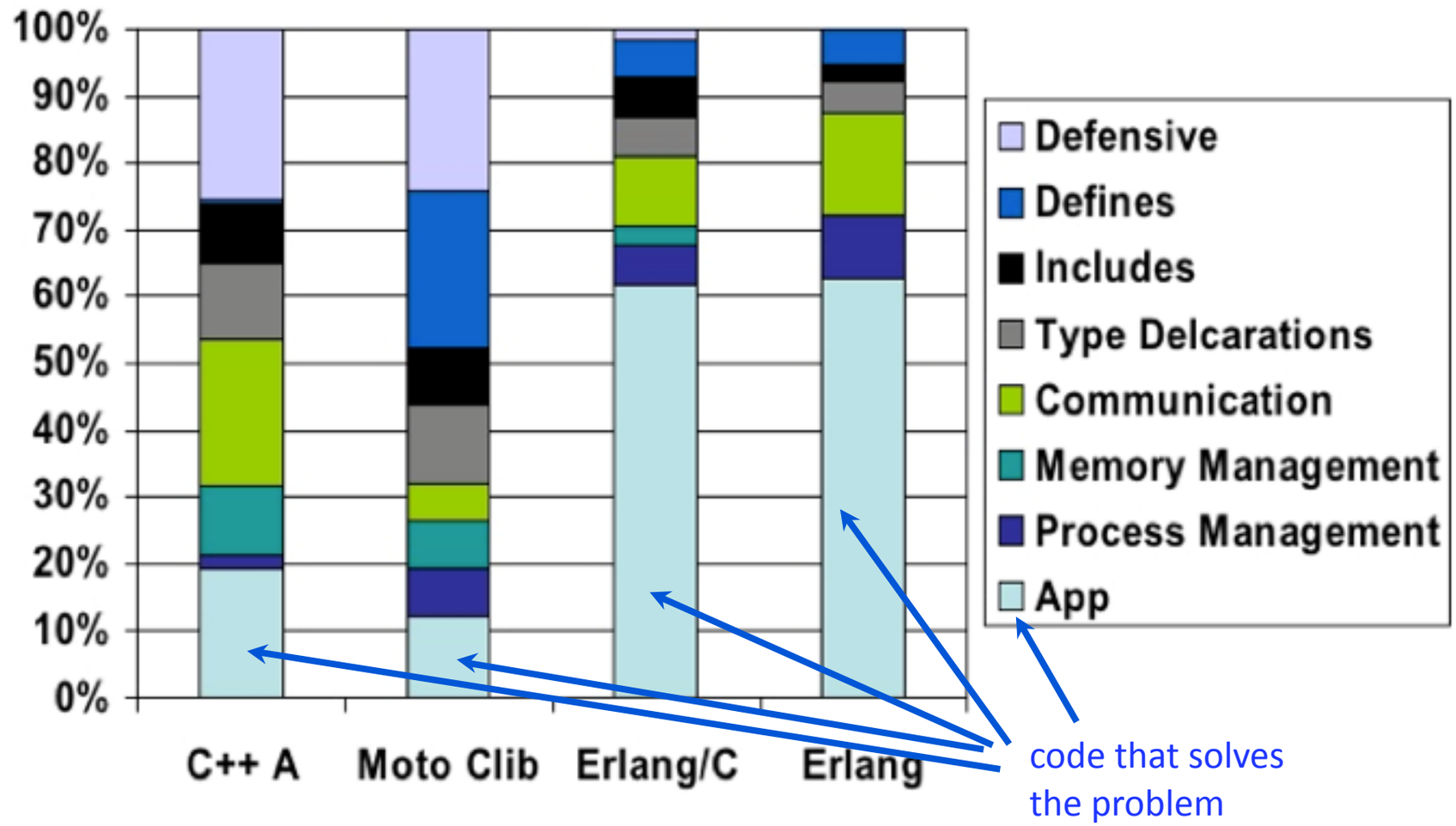

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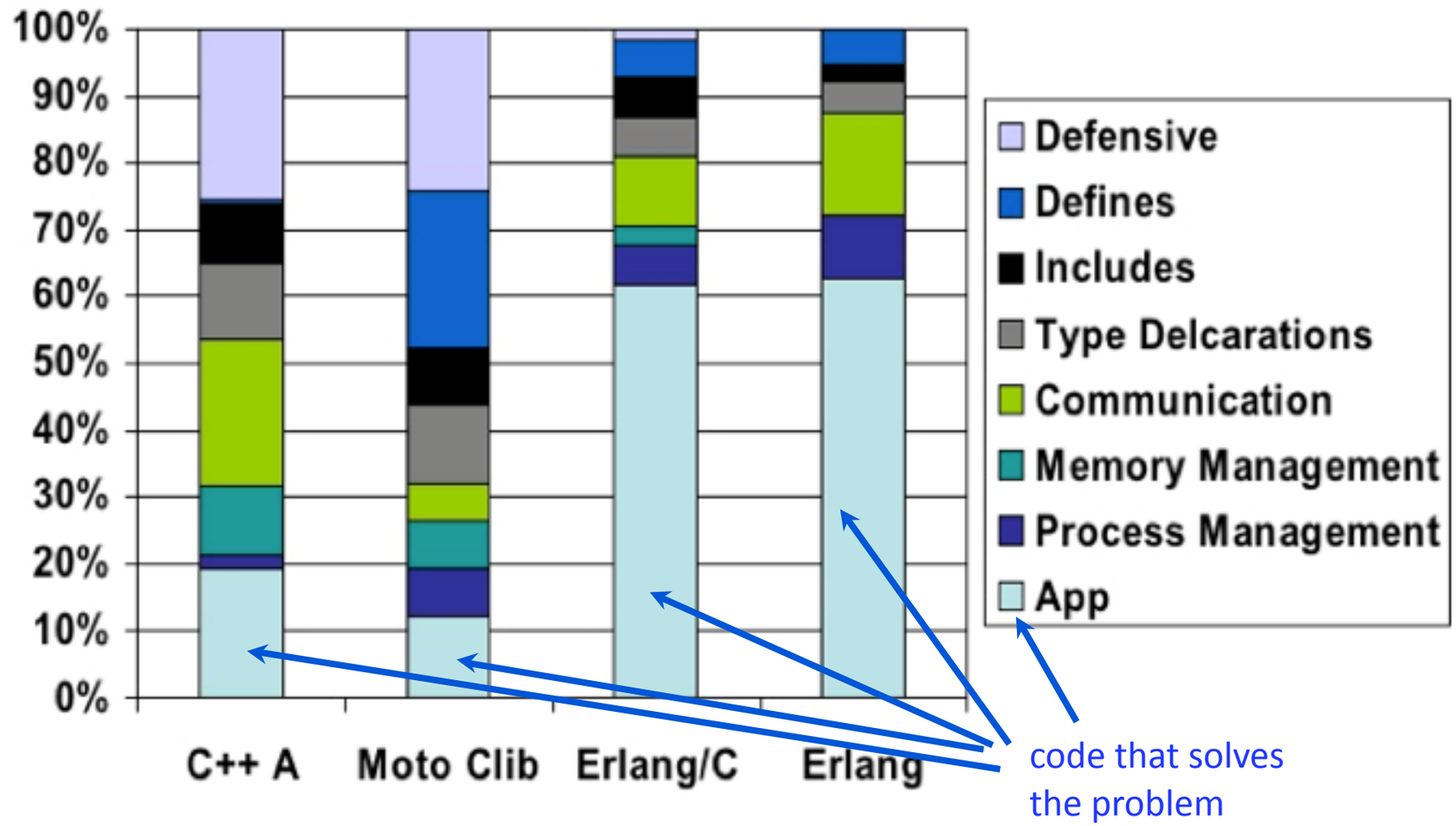

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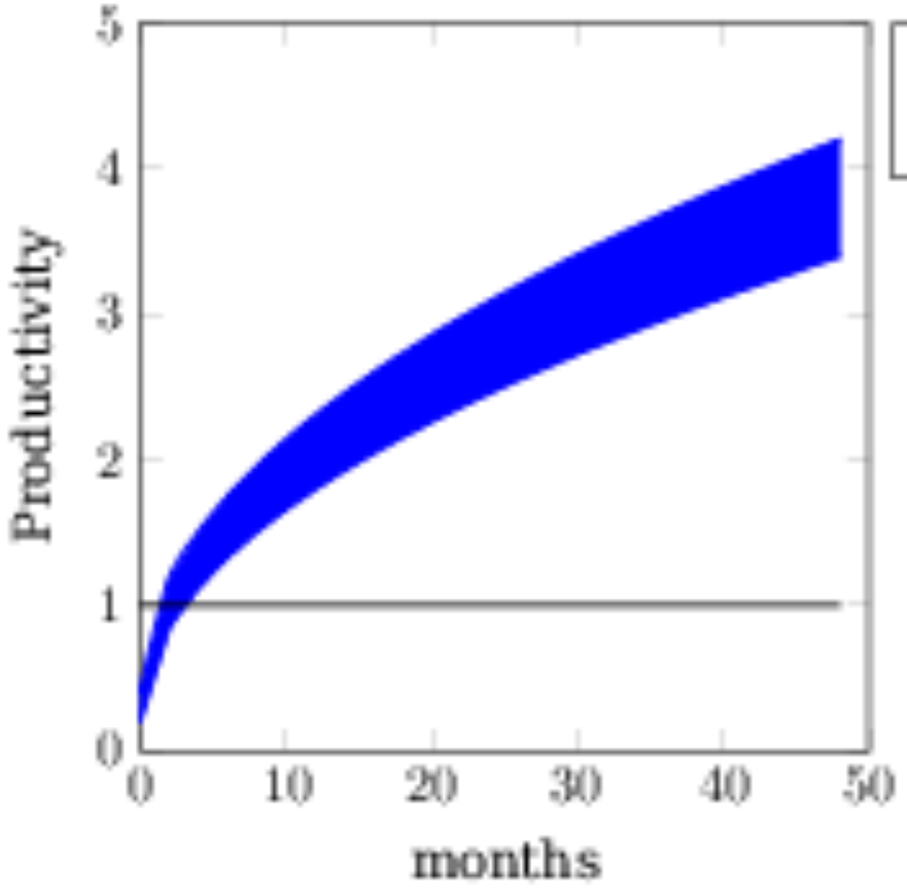
Erlang @ 3x

Show me the money!



Function Point Analysis of the size of the problem

Conservative estimation of the number of inputs, outputs and internal storage

Includes design, box test, system test, project management efforts

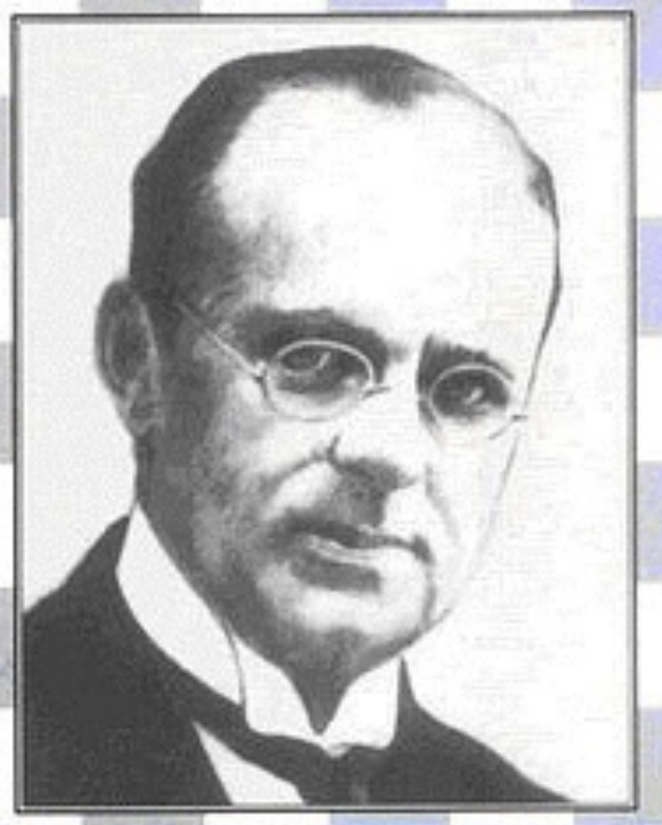
Intermezzo

MY SYSTEM

21st Century Edition

by Aron Nimzowitsch

THE LANDMARK POSITIONAL CHESS TRAINING CLASSIC IN AN EASY-TO-STUDY ALGEBRAIC FORMAT / 419 DIAGRAMS



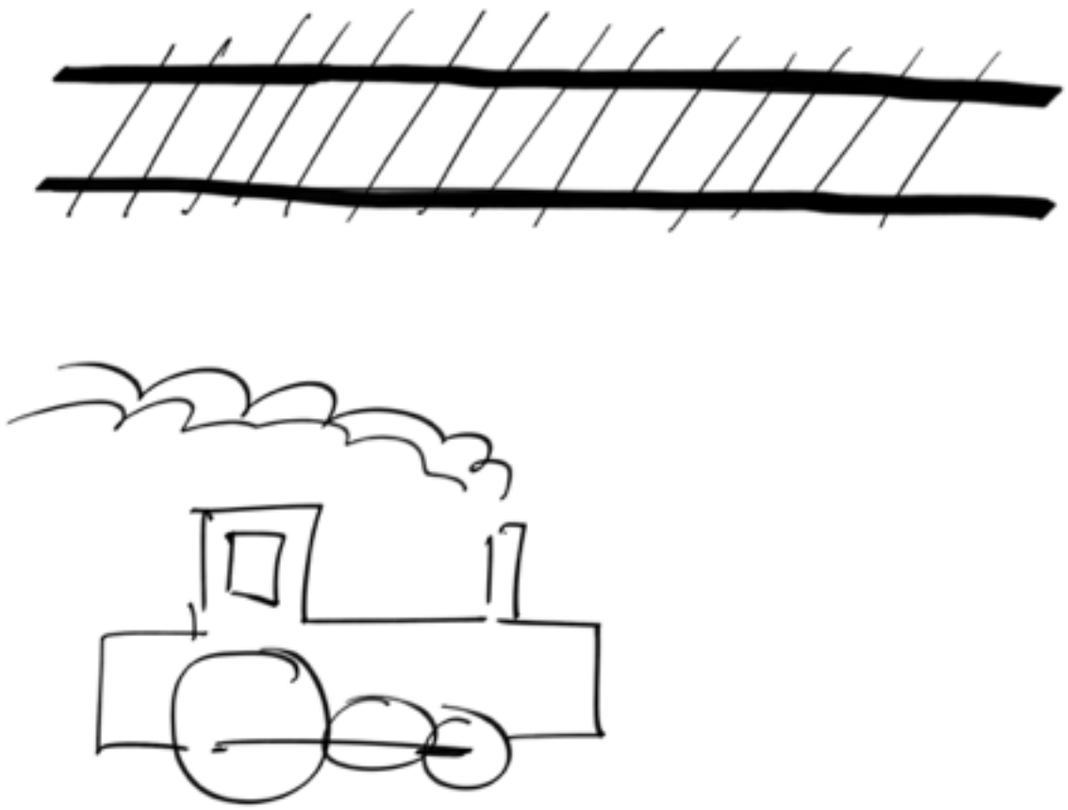
"A thorough knowledge of the elements takes us more than half the road to mastership" -Aron Nimzowitsch

Edited by Lou Hays

Introduction by
International Grandmaster Yasser Seirawan

Language and Models

How many trains on one piece of track?



Language and Models

How many trains on one piece of track?

0..1

Language and Models

How many trains on one piece of track?

0..1

0..N

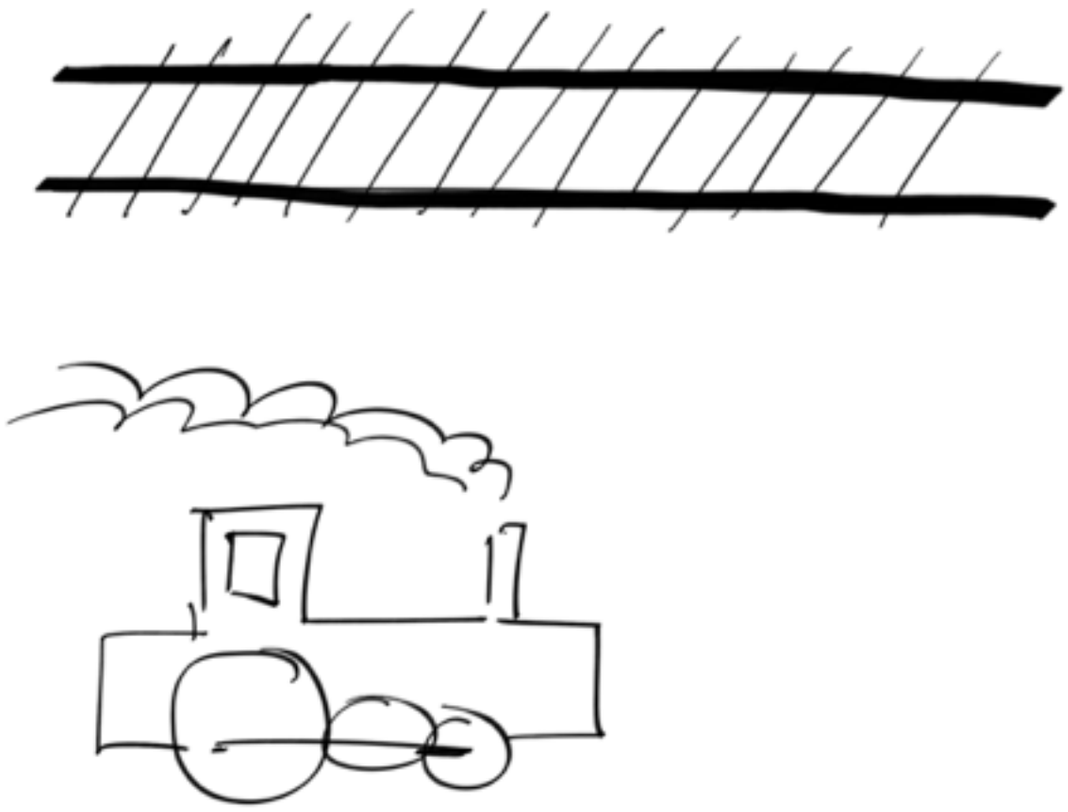
Language and Models

How many trains on one piece of track?

0..N

Language and Models

How many trains on one piece of track?



0..N

Without a language for something you cannot talk about it!

Visual Erlang

Visual Erlang Objectives

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Detailed enough to capture important aspects

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Not suited for 100% explanation of Erlang

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Standardise on how we show Erlang architecture

Visual Erlang Objectives

Detailed enough to capture important aspects

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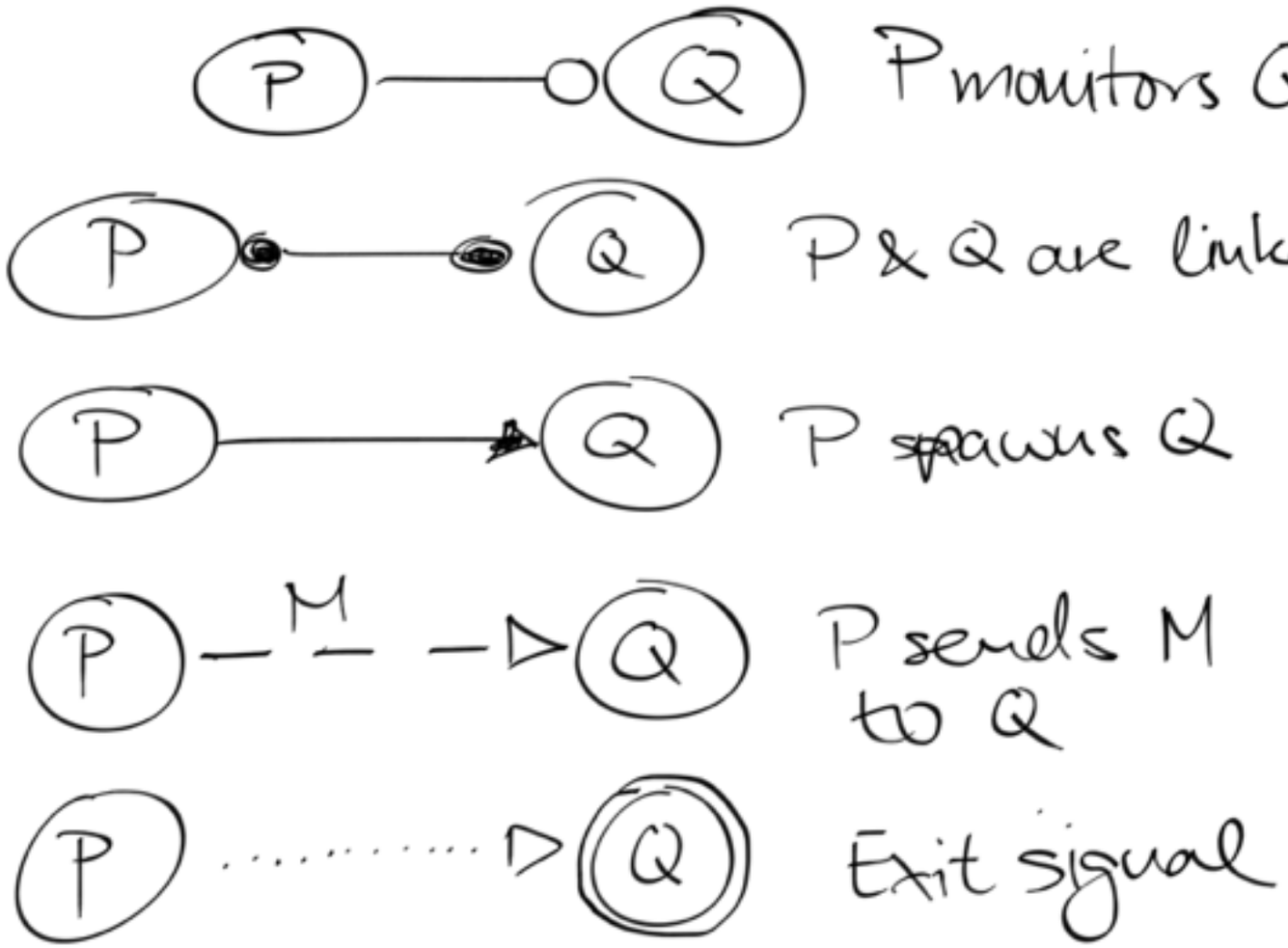
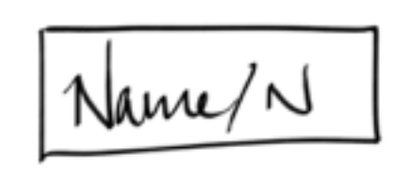
Standardise on how we show Erlang architecture

https://github.com/esl/visual_erlang

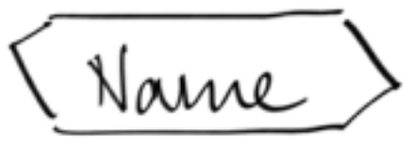
Processes in Visual Erlang



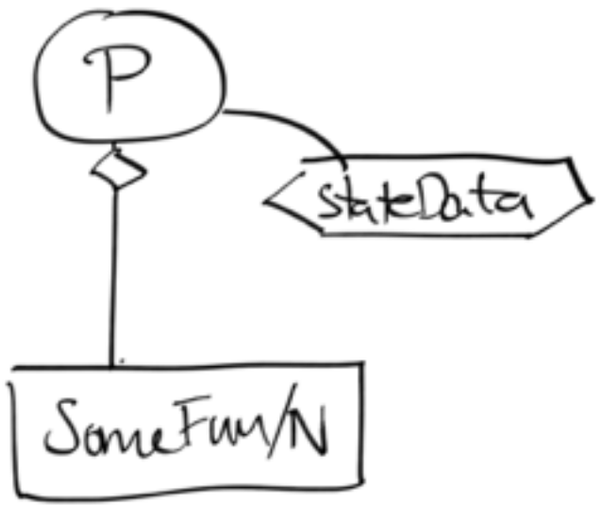
Functions and Statedata



Function Name
w/ arity N



State data for
a function



Process P has
public API
SomeFun/N &
State data
StateData.

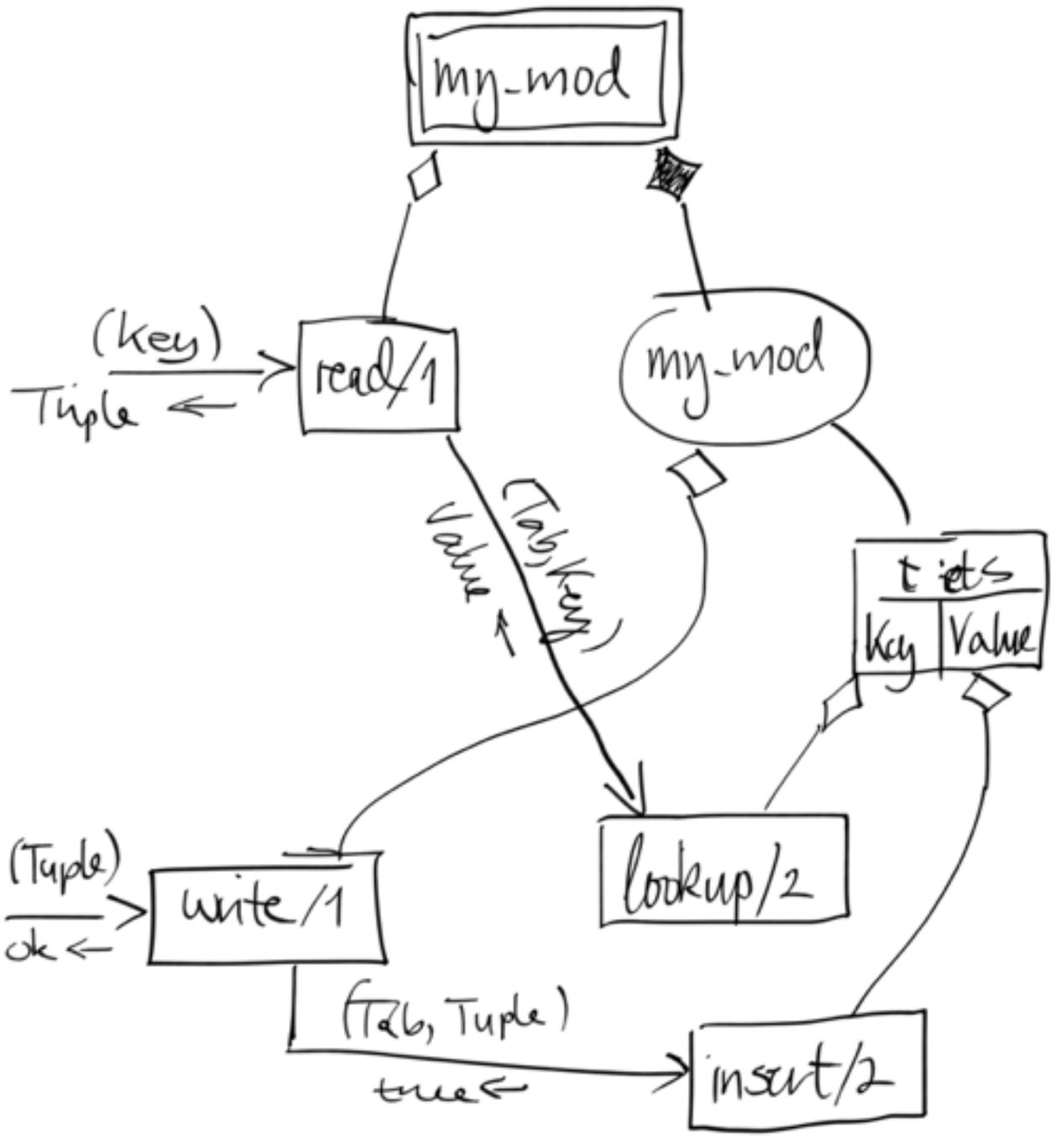
Visual Erlang Patterns

Adds vocabulary about architecture

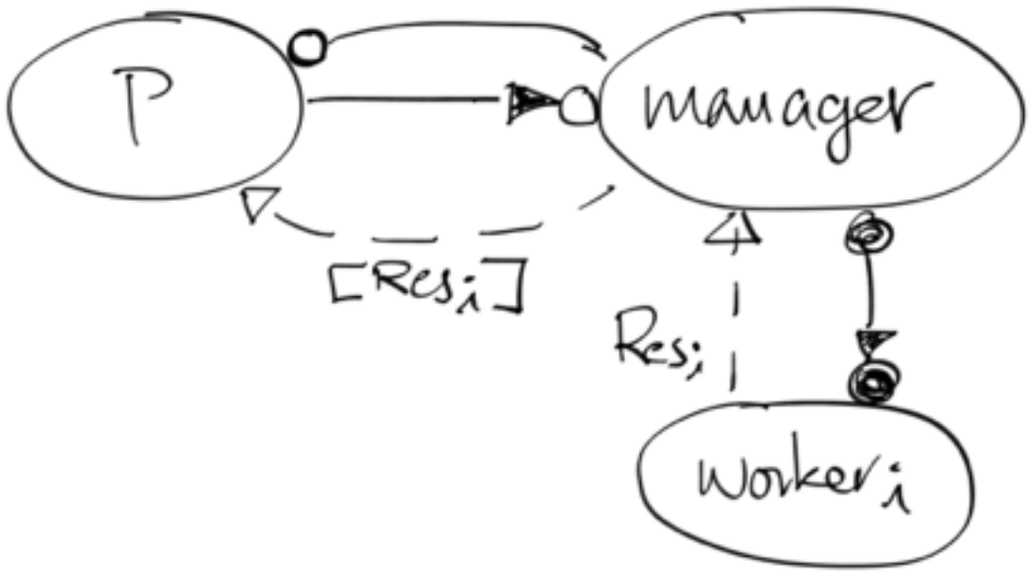
Share insights

Consider failures while designing

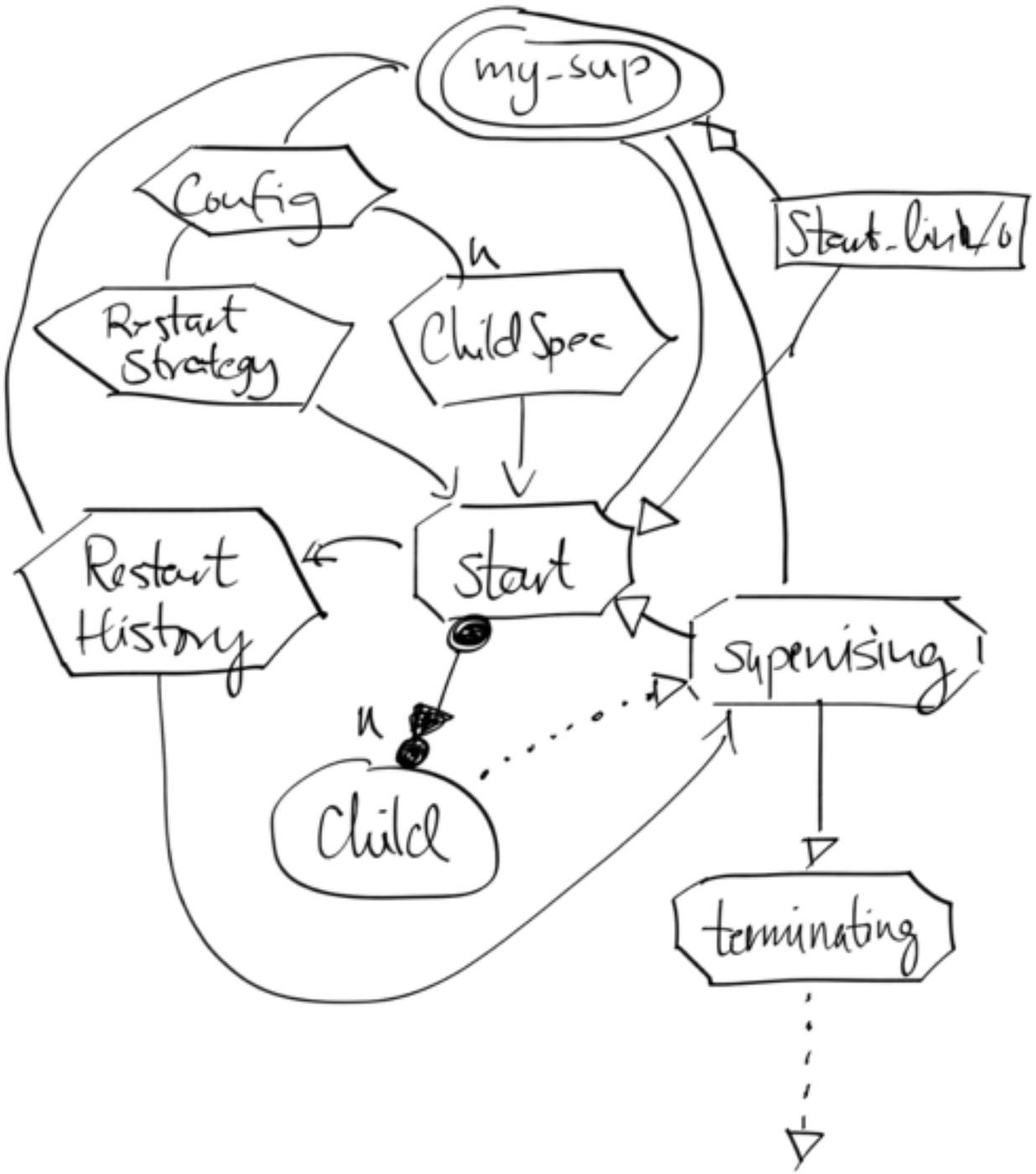
Tuple Space Storage Pattern



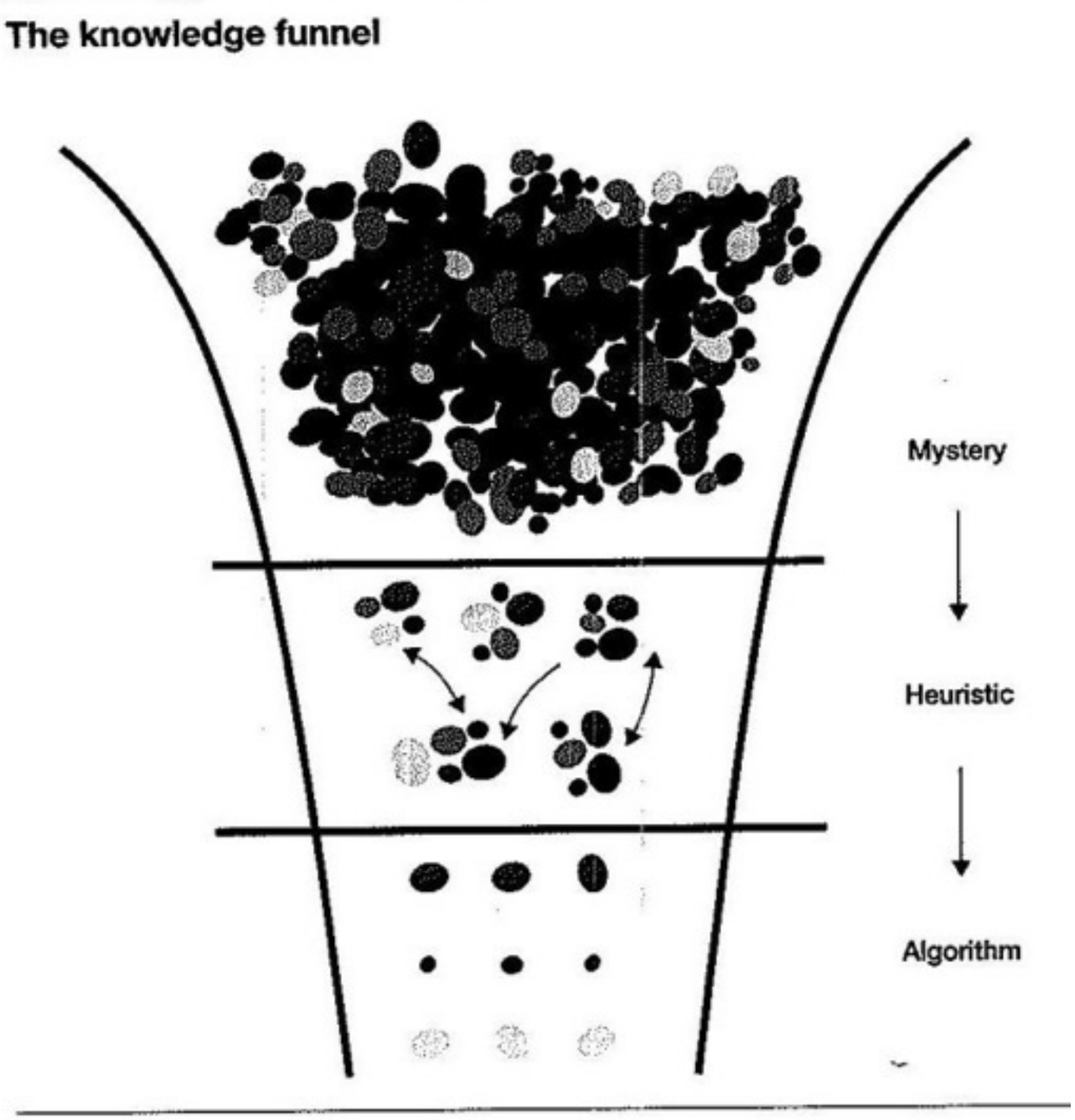
Manager/Worker Pattern



Supervisor Pattern



Why Document Erlang Patterns?



Concept from R. Martin “The Design of Business”

source: http://christianaaddison.wordpress.com/2011/04/19/week-four-ux-boot-camp-co-design/

Realities of software development

????

Source: http://www.thejournal.ie/readme/lunch-atop-skyscraper-photo-men-irish-shanaglish-518110-Jul2012/

Realities of software development

Product Owner

Source: http://www.thejournal.ie/readme/lunch-atop-skyscraper-photo-men-irish-shanaglish-518110-Jul2012/

Business benefits of supervisors

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Only one process dies

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Software architecture
that supports
iterative development

Cruising with Erlang

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Understand the failure model

Embrace failure!

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Use patterns to deliver business value

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