Building Software As Solid As The Pyramids

Ramnivas Laddad & Alef Arendsen

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The one and only slide with bullets!

- Mostly *not* about Spring
- About us
  - Alef Arendsen
    - Long-time Spring committer
    - Principal at SpringSource
  - Ramnivas Ladded
    - Author - AspectJ in Action
    - Principal at SpringSource

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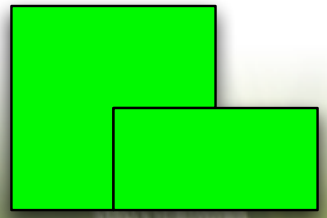
How...



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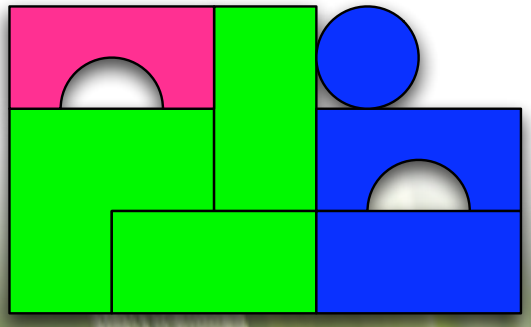
How systems...



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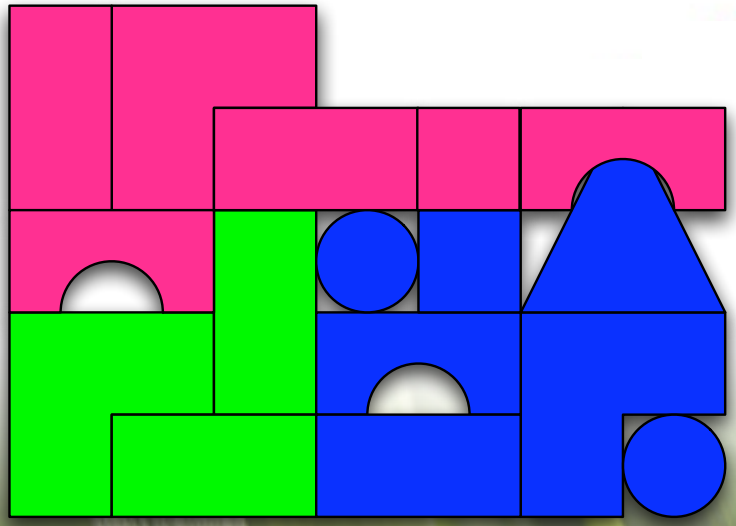
How systems with...



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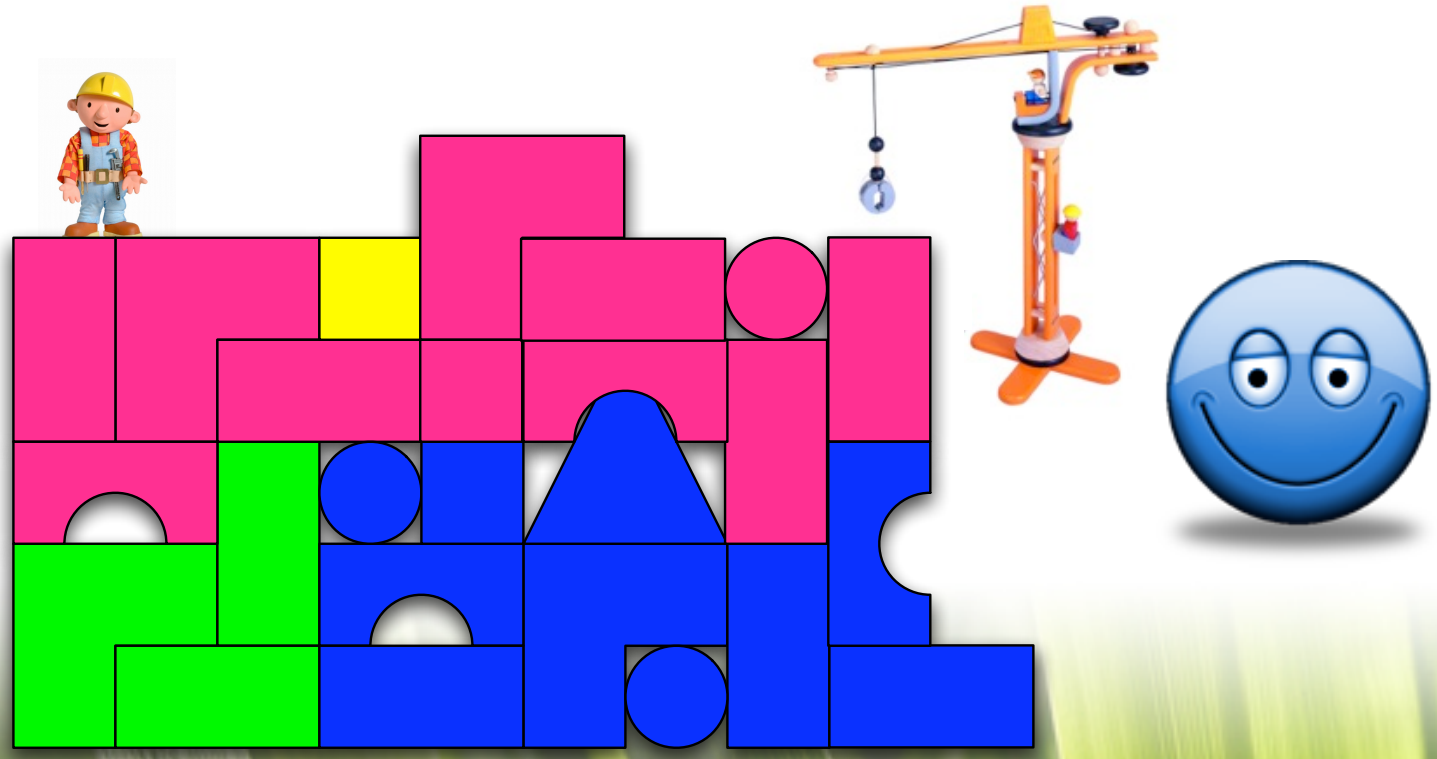
How systems with a clear...



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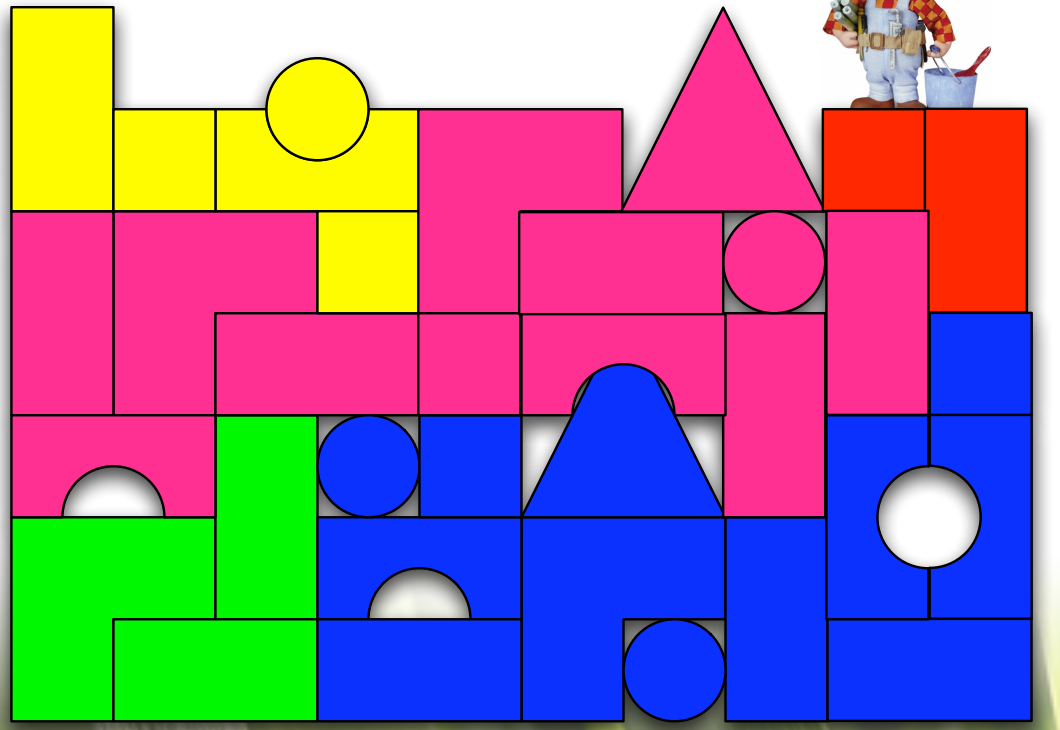
How systems with a clear architecture...



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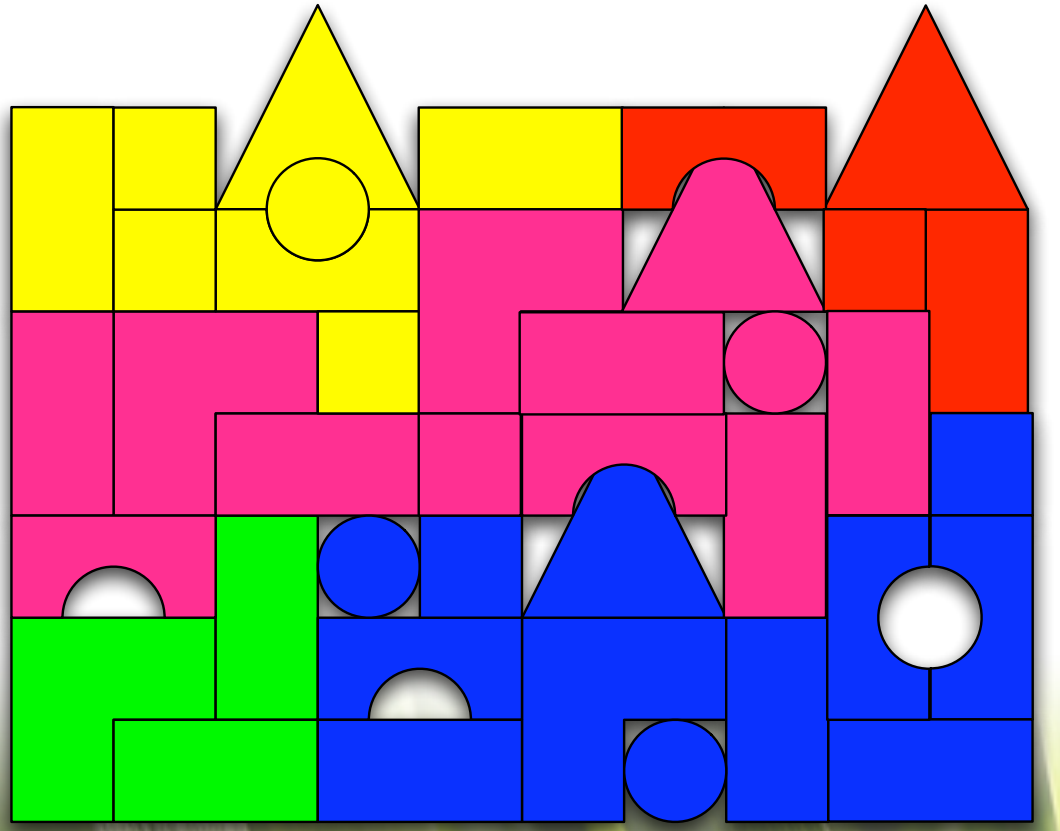
How systems with a clear architecture evolve...



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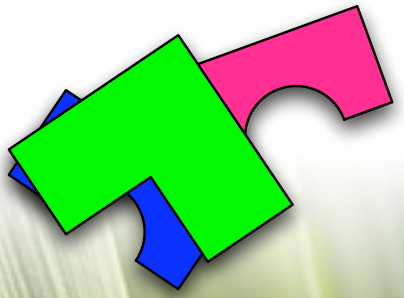
...and...



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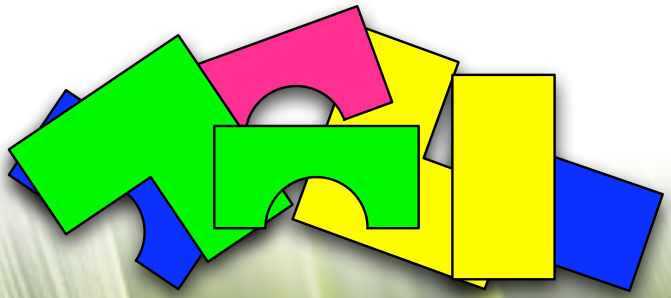
...and how...



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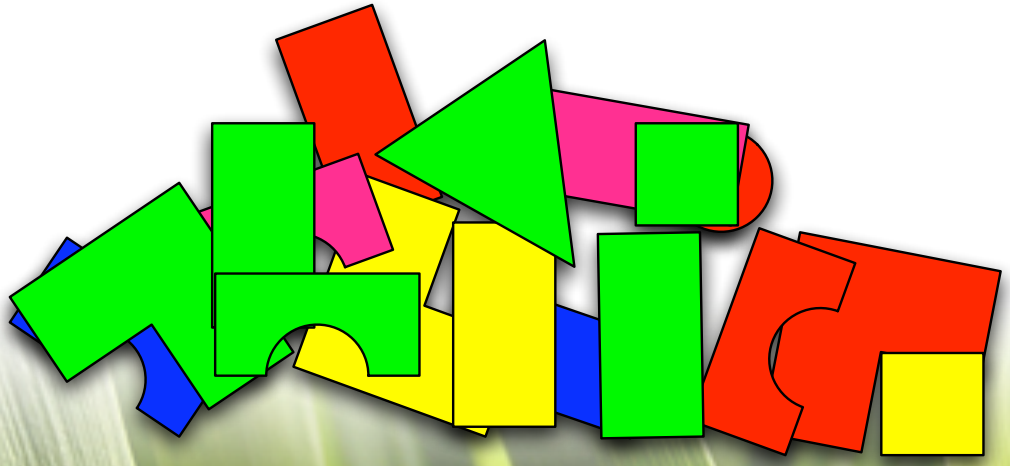
...and how systems...



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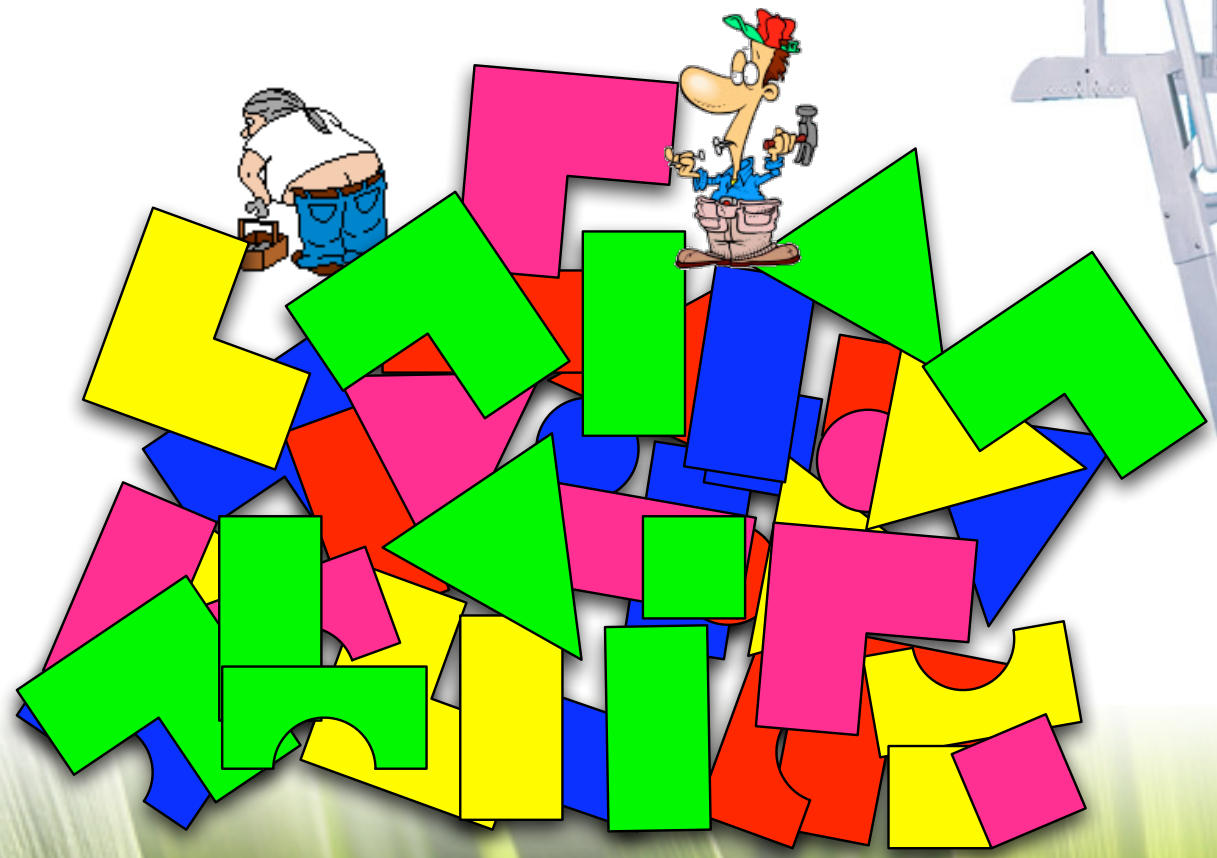
...and how systems normally...



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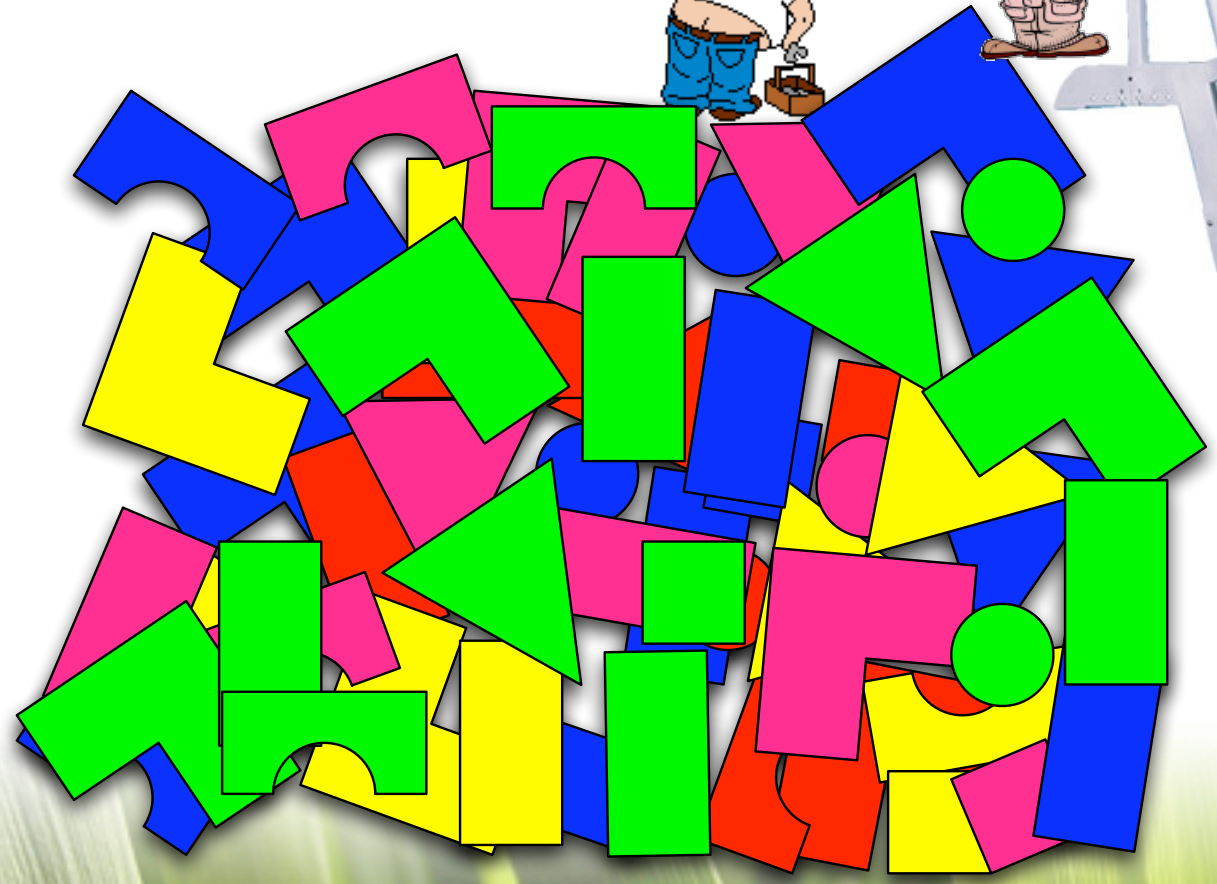
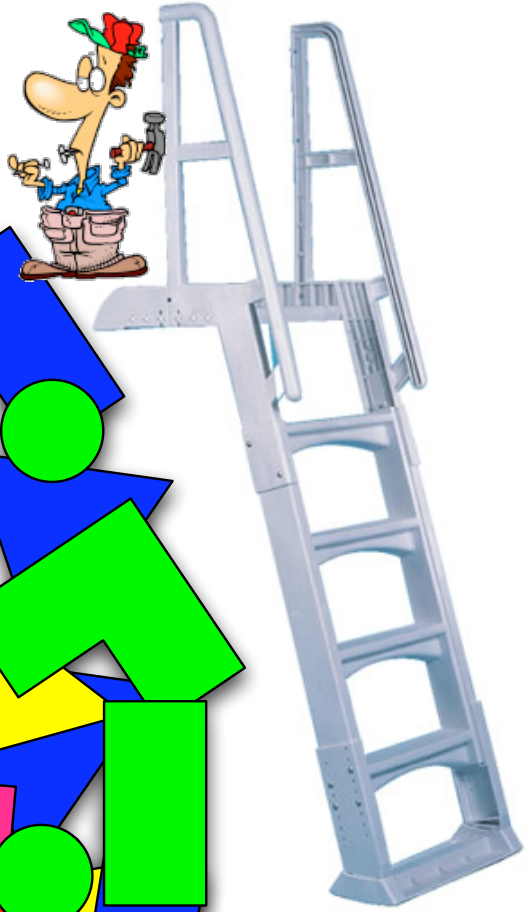
...and how systems normally evolve...





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Architecture drift why does it happen?

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The solution: a reference architecture

We use Log4J, not Commons Logging

Delimit your tx boundaries at the service

Do not use direct JDBC, use Spring JDBC instead

The assembly line should not call the inventory

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HOW MANY OF YOU WORK USING A **reference architecture** OF SOME SORT?

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HOW MANY OF YOU HAVE
a Word (HTML, OpenOffice, PDF)
DOCUMENT DESCRIBING THE
REFERENCE ARCHITECTURE?

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HOW MANY OF YOU USE
a (semi-)automated checking mechanism to enforce
THE REFERENCE ARCHITECTURE?

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Don’t get me wrong!

Reference architectures

ARE VALUABLE

the way you ***ENFORCE*** it is a totally different question however!

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It was a White Face Monkey, sitting in a lush tropical environment, about to start eating a banana. He had a very innocent look on his face.

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You gotta be ***close***!

To the code
I mean...

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Two different ways of setting up architecture enforcement

aspectj

static analysis (based on structure of a code base)

HELLO2MORROW

HeadwaySoftware
the structure guys

LATTIX

dynamic analysis (based on the program flow)

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Static vs. Dynamic (arghh, a bullet slide :)

- Static analysis
  - More powerful features for full-fledged analysis
  - Allows for easy visual representation
  - `Connection conn; // detectable`

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Static vs. Dynamic (arghh, a bullet slide :)

- Dynamic analysis using AspectJ
  - Rule set usable at runtime (very powerful)
  - In some areas less powerful
  - Expressed using a type-safe programming language
  - `Connection conn; // not detectable`

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Different types of enforcement

- Enforcing specific architectural layers / modules
- Enforcing how and if APIs are used
- Enforcing specific idiomatic usage
- Detecting structural complexity and preventing it

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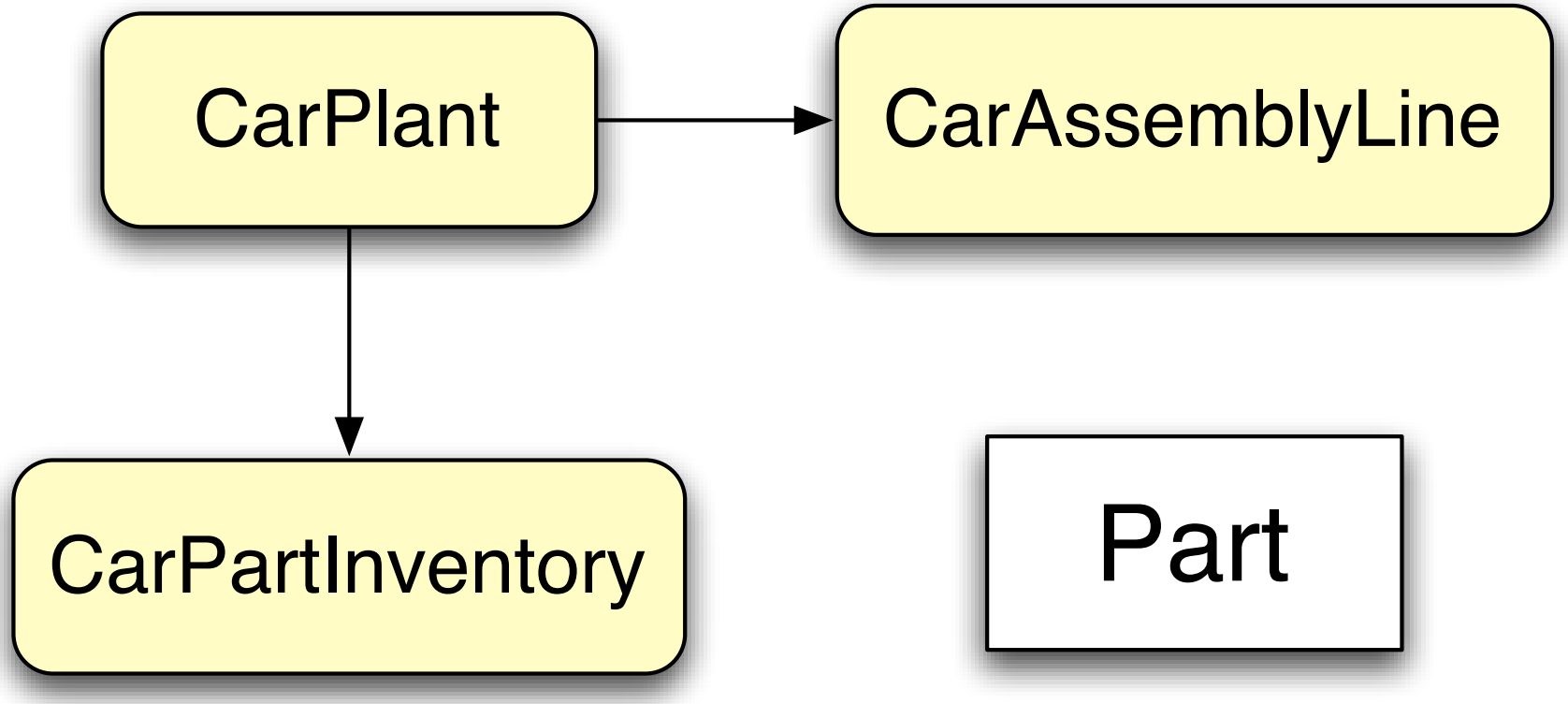

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Chapter 1 Dependencies

1.1 General

1.1.1 There should not be any cyclic dependencies

J KFJDSKL JFKLDSAFJD SKFLDSJAK LJFKLD SAJFKLD SFJKL;SDA; F940 FJFDS FJASDFIODS UOPVGJFDKLJ SDFA;KLFJDSAA./ JFKLDSJ FKLSDAFJ SADL;F JDSKFL ;DSJAAFKL;DS AJFKLDS JFKL;D;SJ KDLSASDAF KL;JFKL;DSAAJ K JFDSKAL;FJ DKSAL; HFJDKSA FDS FHJKDLSAA FHDSKLF DSJAKAFHJKDLSA FJDSA JKLF DSLKJF JKL;DJF K;LD;S AJHJ;DSA;H FDJS;AHG JKLH DSALFDSAAHLKJDS; ./DSA.A/

FDSHFKJ.DSHAFJKLSDAFDSHAFJKLDHAS JKGHDFSJLA.HFGL/SDAHFJDLS.AHFJKDSNVK/LDNF/GSAD J HDSJ. HSJ HFJDL;SSAFDSJSH JLFHDSJKH JKLDSH L. HFJKLDSAH JL;KH FKJDSHA AJKL FHDSJLKAFH JKDLSDAHG FJKLDSAH FFJKLDSAH FJKLDS HFKULDSA HJKLDSA HJUDS HFJDSKLFHSLAK VYDSA;FJDFSH ;LHFJUG;AH JLV;H RGUO;H RJL;FHA JU;REAH OU;AHFGO;U RAHUAGSHU DFSGHUGRA H; DSAHJ;GRAGHJKL; FGHSAKL; GAE.

DEMO

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FDSHFKJ.DSHAFJKLSDAFDSHAFJKLDHAS JKGHDFSJLA.HFGL/SDAHFJDLS.AHFJKDSNVK/LDNF/GSAD J HDSJ. HSJ HFJDL;SSAFDSJSH JLFHDSJKH JKLDSH L. HFJKLDSAH JL;KH FKJDSHA AJKL FHDSJLKAFH JKDLSDAHG FJKLDSAH FFJKLDSAH FJKLDS HFKULDSA HJKLDSA HJUDS HFJDSKLFHSLAK VYDSA;FJDFSH ;LHFJUG;AH JLV;H RGUO;H RJL;FHA JU;REAH OU;AHFGO;U RAHUAGSHU DFSGHUGRA H; DSAHJ;GRAGHJKL; FGHSAKL; GAE.

1.2 Modularity

1.2.1 The AssemblyLine should not call the Inventory

J KFJDSKL JFKLDSAFJD SKFLDSJAK LJFKLD SAJFKLD SFJKL;SDA; F940 FJFDS FJASDFIODS UOPVGJFDKLJ SDFA; KLFJDSAA./ JFKLDSJ FKLSDAFJ SADL;F JDSKFL ;DSJAAFKL;DS AJFKLDS JFKL;D;SJ KDLSASDAF KL;JFKL;DSA AJ K JFDSKAL;FJ DKSAL; HFJDKSA FDS FHJKDLSAA FHDSKLF DSJAKAFHJKDLSA FJDSA JKLF DSLKJF JKL;D JF K;LD;S AJHJ;DSA;H FDJS;AHG JKLH DSALFDSAAHLKJDS; ./DSA.A/

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DEMO

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Chapter 2 API usage

2.1 Always use Spring JDBC, not straight JDBC

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What happens at runtime??

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Chapter 2 API usage

2.1 Always use Spring JDBC, not straight JDBC

J KFJDSKL JFKLDSAFJD SKFLDSJAK LJFKLD SAJFKLD SFJKL;SDA; F940 FJFDS FJASDFIODS UOPVGJFDKLJ SDFA;KLFJDSAA../ JFKLDSJ FKLSDAFJ SADL;F JDSKFL ;DSJAAFKL;DS AJFKLDS JFKL;D;SJ KDLSASDAF KL;JFKL;DSAAJ K JFDSKAL;FJ DKSAL; HFJDKSA FDS FHJKDLSAA FHDSKLF DSJAKAFHJKDLSA FJDSA JKLF DSLKJF JKL;DJF K;LD;S AJHJ;DSA;H FDJS;AHG JKLH DSALFDSAAHLKJDS; ./DSA.A/

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2.2 Flush Session before using JDBC

J KFJDSKL JFKLDSAFJD SKFLDSJAK LJFKLD SAJFKLD SFJKL;SDA; F940 FJFDS FJASDFIODS UOPVGJFDKLJ SDFA;KLFJDSAA../ JFKLDSJ FKLSDAFJ SADL;F JDSKFL ;DSJAAFKL;DS AJFKLDS JFKL;D;SJ KDLSASDAF KL;JFKL;DSAAJ K JFDSKAL;FJ DKSAL; HFJDKSA FDS FHJKDLSAA FHDSKLF DSJAKAFHJKDLSA FJDSA JKLF DSLKJF JKL;DJF K;LD;S AJHJ;DSA;H FDJS;AHG JKLH DSALFDSAAHLKJDS; ./DSA.A/FDSHFKJ.DSHAFJKLSDAFDSHAFJKLDHAS JKGHDFSJLAFJ KDS FKDLSFJ DSLFH DSJKF GHDSAKJLF HDSJKFH DSJKLFDSH JFKLDSH FJKDSAH JKLDS
\

HFGL/SDAHFJDLS.AHFJKDSNVK/LDNF/GSAD J HDSJ. HSJ HFJDL;SSAFDSJSH JLFHDSJKH JKLDSH L. HFJKLDSAH JL;KH FKJDSHA AJKL FHDSJLKAFH JKDLSDAHG FJKLDSAH FFJKLDSAH FJKLDS HFKULDSA HJKLDSA HJUDS HFJDSKLFHSLAK VYDSA;FJDFSH ;LHFJUG;AH JLV;H RGUO;H RJL;FHA JU;REAH OU;AHFGO;U RAHUAGSHU DFSGHUGRA H; DSAHJ;GRAGHJKL; FGHSAKL; GAE.

DEMO

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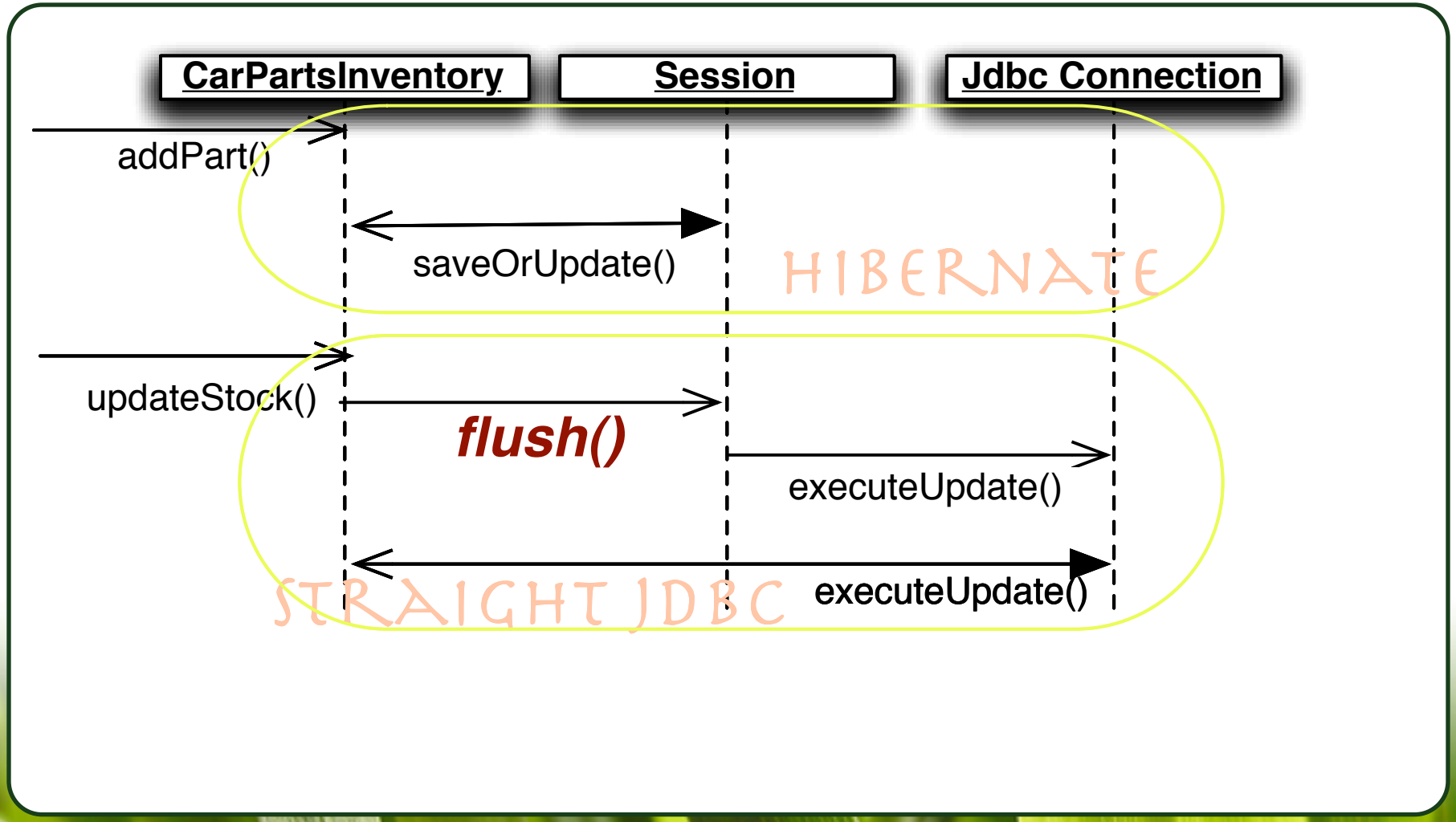
A typical problem in every CarPlant...



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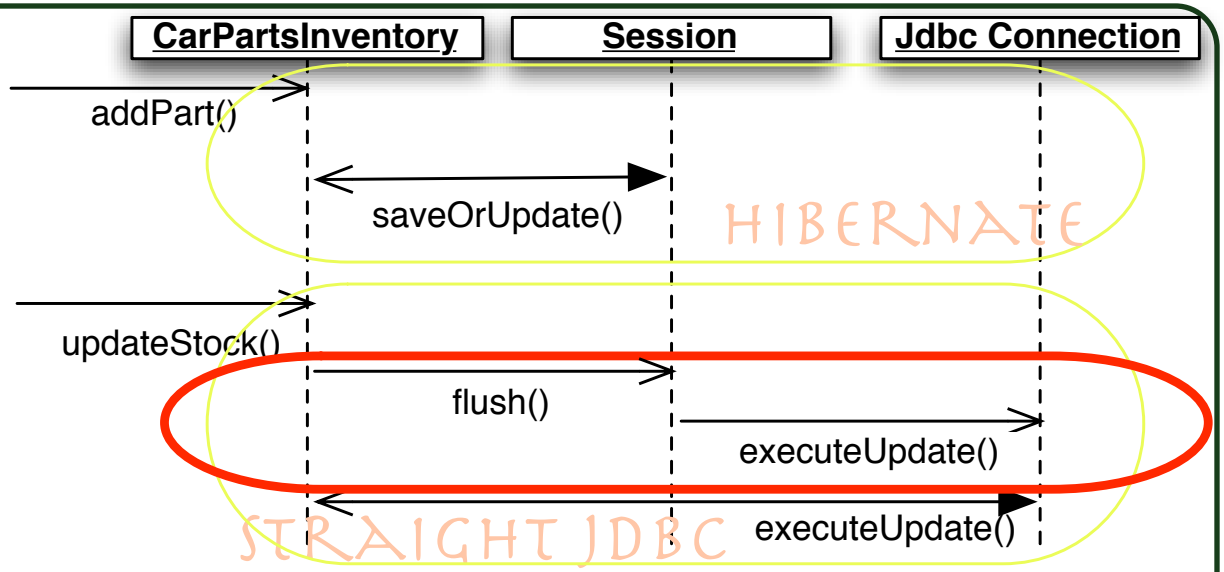
How?



Define a sequence diagram displaying the flow in normal circumstances

If needed, add the behavior you'd like to enforce
Extract the behavior and put it in a separate module (e.g. <aop:aspect>)

Make sure the behavior is always executed and not bypassed!

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Can we enforce this??

Yes, but not using the techniques we have seen until now.

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Chapter 3 Idiomatic usages

3.1 Never return null collection or map

J KFJDSKL JFKLDSAFJD SKFLDSJAK LJFKLD SAJFKLD SFJKL;SDA; F940 FJFDS FJASDFIODS UOPVQJFDKLJ SDFA;KLFJDSAA./ JFKLDSJ FKLSDAFJ SADL;F JDSKFL ;DSJAAFKL;DS AJFKLDS JFKL;D;SJ KDLSASDAF KL;JFKL;DSAAJ K JFDSKAL;FJ DKSAL; HFJDKSA FDS FHJKDLSAA FHDSKLF DSJAKAFHJKDLSA FJDSA JKLF DSLKJF JKL;DJF K;LD;S AJHJ;DSA;H FDJS;AHG JKLH DSALFDSAAHLKJDS; ./DSA.A/

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DEMO

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The good, so-so, bad and ugly

- **Shall I checked returned collections for null?**
  - Good: No, we always return empty collections
  - So-so: Yes, you must always do so
  - Bad: Perhaps, check the JavaDoc for the method
  - Ugly: Maybe, let's see what happens

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Chapter 4 Contracts

4.1 Thread unsafe objects must not be accessed by multiple threads simultaneously

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DEMO

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Trust, but verify

- Contract
  - Code is written with certain usage expectation
- Enforcement
  - Someone must enforce the contract

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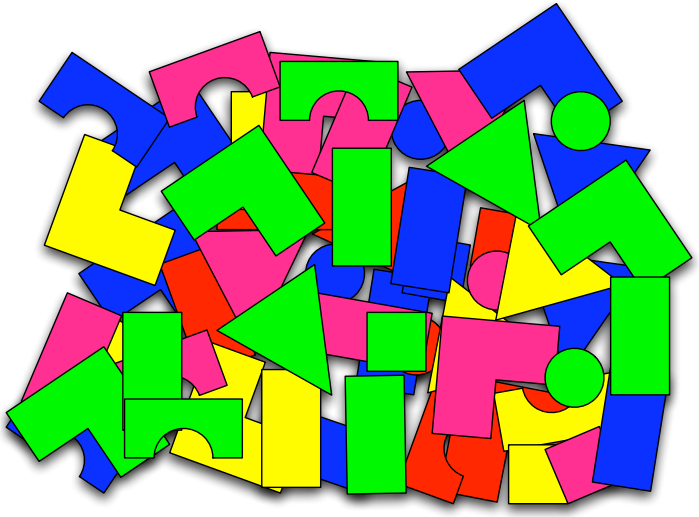

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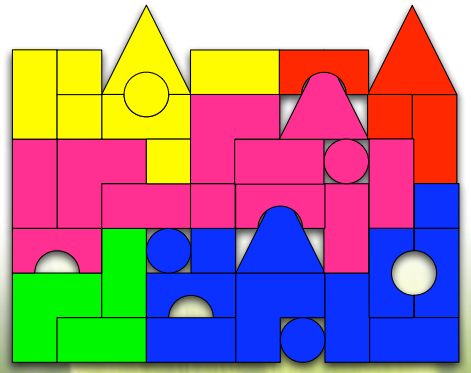

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Getting to a better architecture don’t do it all at once!!

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First, implement warning signs that help you stay on the road...

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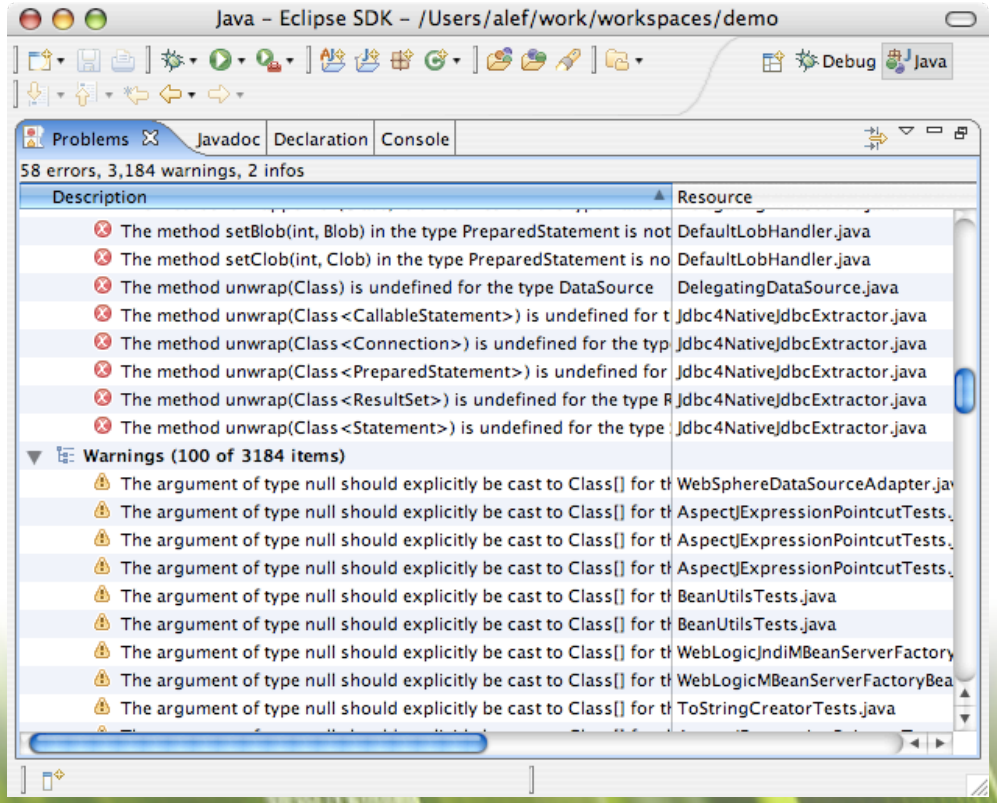

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Cleaning things up right now does not work - just try to enjoy it

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Fix existing violations as you encounter them

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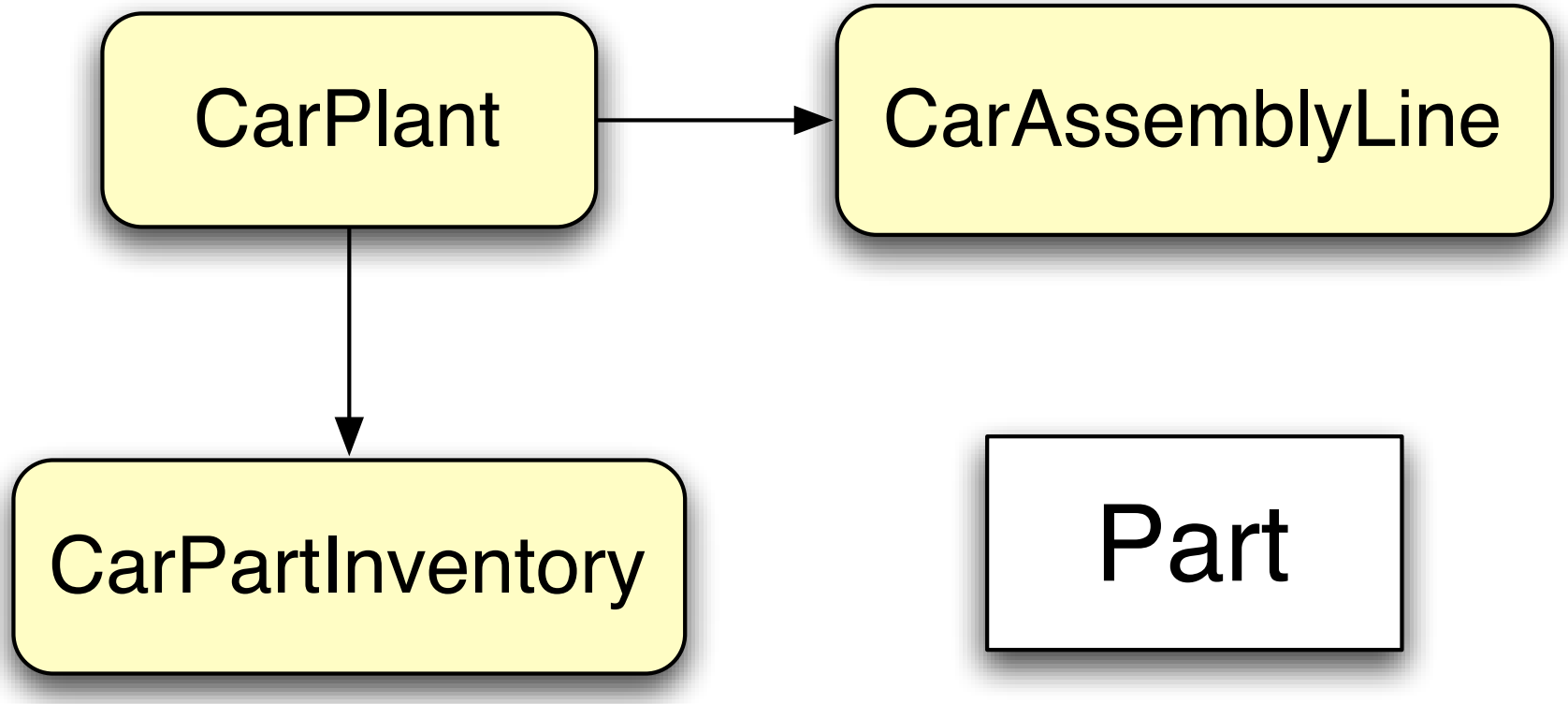

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Conclusion and questions

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