

7 Topics Concerning Languages & Architecture

Stefan Tilkov | @stilkov | JUG KA 2011



<http://www.innoq.com>

Stefan Tilkov

stefan.tilkov@innoq.com

[@stilkov](#)



<http://rest-http.info>




1. Language Equality

Languages are Not Equal

Machine Code
Assembler
C
C++
Java
Scala
Python
Ruby
Scheme/Lisp
Haskell


Sapir-Whorf



**We cut nature up, organize it into concepts,
and ascribe significances as we do, largely
because we are parties to an agreement to
organize it in this way — an agreement that
holds throughout our speech community and
is codified in the patterns of our language.**

Whorf, Benjamin (John Carroll, Editor) (1956). *Language, Thought, and Reality: Selected Writings of Benjamin Lee Whorf*. MIT Press.
“Sapir-Whorf Hypothesis” (note: now disputed);
see also http://en.wikipedia.org/wiki/Sapir-Whorf_hypothesis

“Blub”



Blub falls right in the middle of the abstractness continuum... As long as our hypothetical Blub programmer is looking down the power continuum, he knows he's looking down. Languages less powerful than Blub are obviously less powerful, because they're missing some feature he's used to.

But when our hypothetical Blub programmer looks in the other direction, up the power continuum, he doesn't realize he's looking up. What he sees are merely weird languages... Blub is good enough for him, because he *thinks* in Blub.

Paul Graham, “Beating the Averages”
<http://www.paulgraham.com/avg.html>

Paradigm

Speed


Verbosity

Ceremony

Stability

Learning Curve

Type System



**To be quite honest, most Javalanders are
blissfully unaware of the existence of the
other side of the world.**

Steve Yegge

<http://steve-yegge.blogspot.com/2006/03/execution-in-kingdom-of-anouns.html>

For want of a nail the shoe was lost.
For want of a shoe the horse was lost.
For want of a horse the rider was lost.
For want of a rider the battle was lost.
For want of a battle the kingdom was lost.
And all for the want of a horseshoe nail.

```
For the lack of a nail,  
    throw new HorseshoeNailNotFoundException("no nails!");
```

For the lack of a horseshoe,
EquestrianDoctor.getLocalInstance().getHorseDispatcher().shoot();

For the lack of a horse,
RidersGuild.getRiderNotificationSubscriberList().getBroadcaster().run(
new BroadcastMessage(StableFactory.getNullHorseInstance()));


```
For the lack of a rider,  
MessageDeliverySubsystem.getLogger().logDeliveryFailure(  
    MessageFactory.getAbstractMessageInstance(  
        new MessageMedium(MessageType.VERBAL),  
        new MessageTransport(MessageTransportType.MOUNTED_RIDER),  
        new MessageSessionDestination(BattleManager.getRoutingInfo(  
            BattleLocation.NEAREST))),  
    MessageFailureReasonCode.UNKNOWN_RIDER_FAILURE);
```

```
For the lack of a message,  
((BattleNotificationSender)  
    BattleResourceMediator.getMediatorInstance().getResource(  
        BattleParticipant.PROXY_PARTICIPANT,  
        BattleResource.BATTLE_NOTIFICATION_SENDER)).sendNotification(  
        ((BattleNotificationBuilder)  
            (BattleResourceMediator.getMediatorInstance().getResource(  
                BattleOrganizer.getBattleParticipant(Battle.Participant.GOOD_GUYS),  
                BattleResource.BATTLE_NOTIFICATION_BUILDER))).buildNotification(  
                    BattleOrganizer.getBattleState(BattleResult.BATTLE_LOST),  
                    BattleManager.getChainOfCommand().getCommandChainNotifier())));
```

```

For the lack of a battle,
try {
    synchronized(BattleInformationRouterLock.getLockInstance()) {
        BattleInformationRouterLock.getLockInstance().wait();
    }
} catch (InterruptedException ix) {
    if (BattleSessionManager.getBattleStatus(
        BattleResource.getLocalizedName(BattleResource(Locale.getDefault()),
        BattleContext.createContext(
            Kingdom.getMasterBattleCoordinatorInstance(
                new TweedleBeetlePuddlePaddleBattle()).populate(
                    Region.getProvince(Armpit.LEFTMOST)))) == BattleStatus.LOST) {
        if (LOGGER.isLoggable(Level.TOTALLY_SCREWED)) {
            LOGGER.logScrewage(BattleLogger.createBattleLogMessage(
                BattleStatusFormatter.format(BattleStatus.LOST_WAR,
                    Locale.getDefault())));
        }
    }
}

```

```
For the lack of a war,  
new ServiceExecutionJoinPoint(  
    DistributedQueryAnalyzer.forwardQueryResult(  
        NotificationSchemaManager.getAbstractSchemaMapper(  
            new PublishSubscribeNotificationSchema()).getSchemaProxy().  
            executePublishSubscribeQueryPlan(  
                NotificationSchema.ALERT,  
                new NotificationSchemaPriority(SchemaPriority.MAX_PRIORITY),  
                new PublisherMessage(MessageFactory.getAbstractMessage(  
                    MessageType.WRITTEN,  
                    new MessageTransport(MessageTransportType.WOUNDED_SURVIVOR),  
                    new MessageSessionDestination(  
                        DestinationManager.getNullDestinationForQueryPlan()))),  
                DistributedWarMachine.getPartyRoleManager().getRegisteredParties(  
                    PartyRoleManager.PARTY_KING ||  
                    PartyRoleManager.PARTY_GENERAL ||  
                    PartyRoleManager.PARTY_AMBASSADOR)).getQueryResult(),  
                PriorityMessageDispatcher.getPriorityDispatchInstance()))).  
    waitForService();
```

All for the lack of a horseshoe nail.

A Little Bit of Java ...

```
package com.example;

import java.util.List;
import java.util.Arrays;
import java.util.Collections;
import java.util.Comparator;

public class SortList {
    public static void main(String[] args) {
        List<String> list = Arrays.asList("Shamelessly", "Stolen",
                                          "From", "Ola", "Bini");

        Collections.sort(list, new Comparator<String>() {
            public int compare(String first, String second) {
                return first.length() - second.length();
            }
        });

        String sep = "";
        for (String name : list) {
            System.out.print(sep);
            System.out.print(name);
            sep = ", ";
        }

        System.out.println();
    }
}
```

... vs. Ruby

```
list = ["Shamelessly", "Stolen", "From", "Ola", "Bini"]  
puts list.sort_by(&:length).join(', ')
```

<http://youtube.com/watch?v=PfnP-8XbJao>



Clojure

```
(ns sample.grep
  "A simple complete Clojure program."
  (:use [clojure.contrib.io :only [read-lines]])
  (:gen-class))

(defn numbered-lines [lines]
  (map vector (iterate inc 0) lines))

(defn grep-in-file [pattern file]
  {file (filter #(re-find pattern (second %)) (numbered-lines (read-lines file))))})

(defn grep-in-files [pattern files]
  (apply merge (map #(grep-in-file pattern %) files)))

(defn print-matches [matches]
  (doseq [[fname submatches] matches, [line-no, match] submatches]
    (println (str fname ":" line-no ":" match))))

(defn -main [pattern & files]
  (if (or (nil? pattern) (empty? files))
    (println "Usage: grep <pattern> <file...>")
    (do
      (println (format "grep started with pattern %s and file(s) %s"
                       pattern (apply str (interpose ", " files))))
      (print-matches (grep-in-files (re-pattern pattern) files))
      (println "Done."))))
```



**Patterns are signs of weakness in
programming languages.**

**Mark Dominus, “Design Patterns of 1972”,
<http://blog.plover.com/2006/09/11/>**

Yet ...

... languages don't matter

HTTP

URIs

HTML

CSS

Clients

Web Servers

Caching Proxies

CDN

Atom/RSS

Databases

1. Language Equality

Languages differ drastically

2. Ecosystems

Development Environment

Libraries

Runtime Environment

Community

Culture

2. Ecosystems

No language is an island

3. Multi-language Platforms

.NET

JVM

.NET

C#

VB

F#

IronPython

IronRuby

DLR

JVM

Java

JRuby

Scala

Groovy

Clojure

JSR 292/DaVinci

innoQ

**Development
Environment**

Libraries

**Runtime
Environment**

Community

Culture

**Development
Environment**

Community

Culture

Libraries

**Runtime
Environment**

3. Multi-language platforms

MLVMs enable diversity

4. Polyglot Programming

Question:
What language do you use?

Question:
What languagess do you use?

sh XSLT cmd
SQL XML BPEL
CSS
HTML EL Ant
JavaScript
OGNL

4. Polyglot programming

***Nobody* uses a single
language**

5. Stability Layers

domain

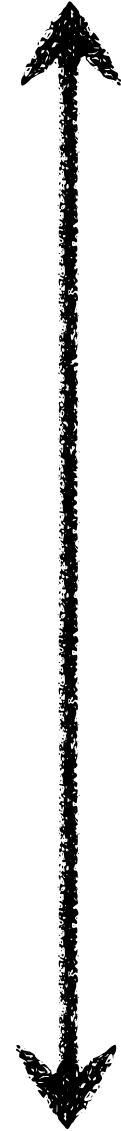
dynamic

stable

See <http://ola-bini.blogspot.com/2008/01/language-explorations.html>



“soft”




Application

Core Domain

Engine

“hard”



**Any sufficiently complicated C or Fortran
program contains an ad-hoc, informally-
specified, bug-ridden, slow implementation
of half of CommonLisp.**

Philip Greenspun's Tenth Rule of Programming
<http://philip.greenspun.com/research/>

5. Stability layers

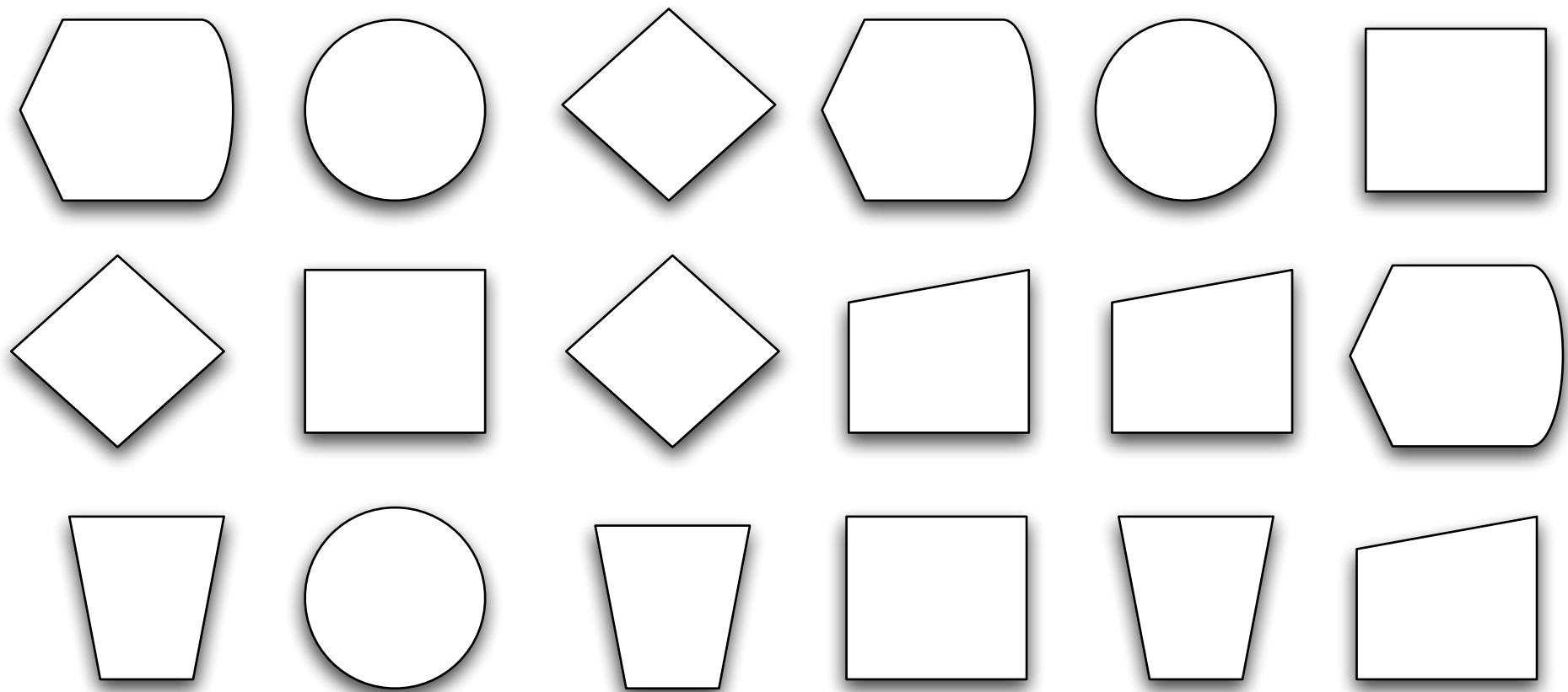
**Soft and hard spots suggest
different languages**

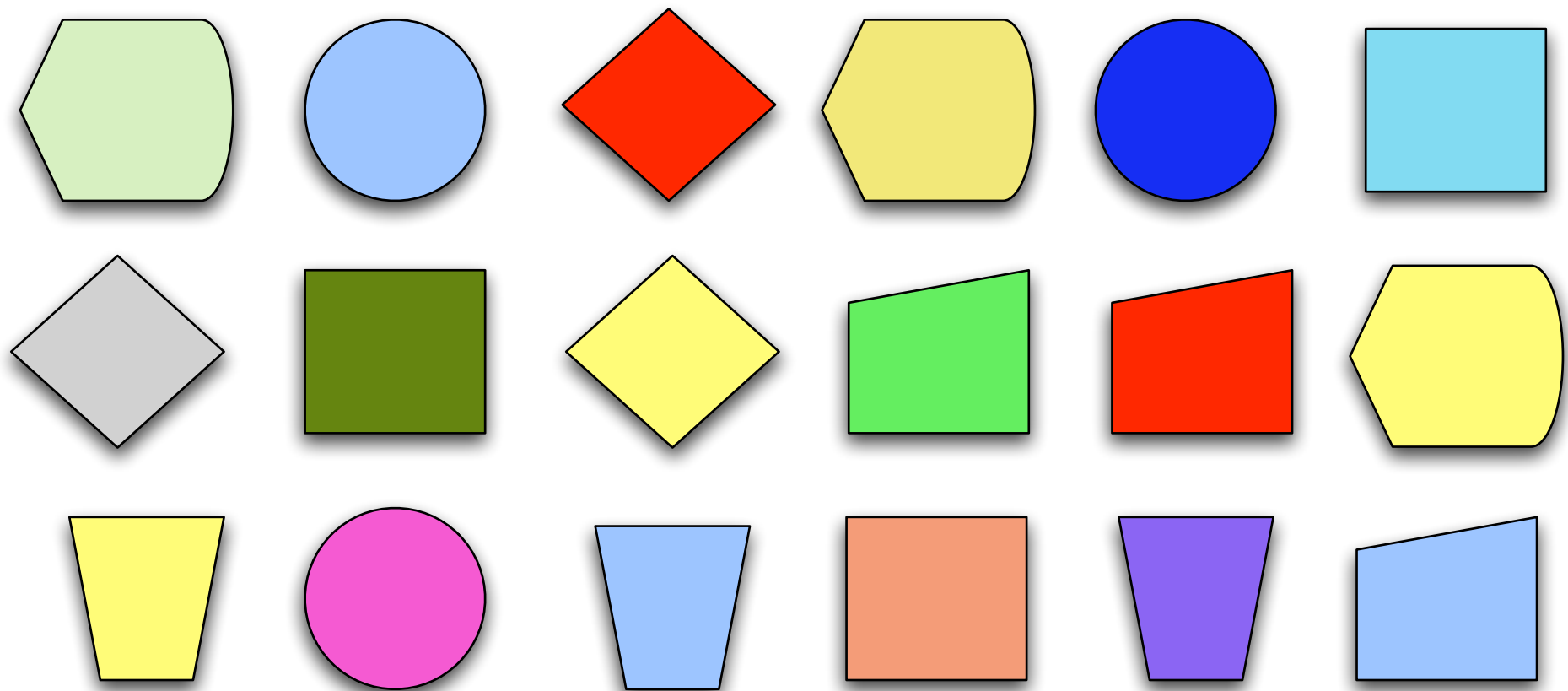
6. Distributed Systems

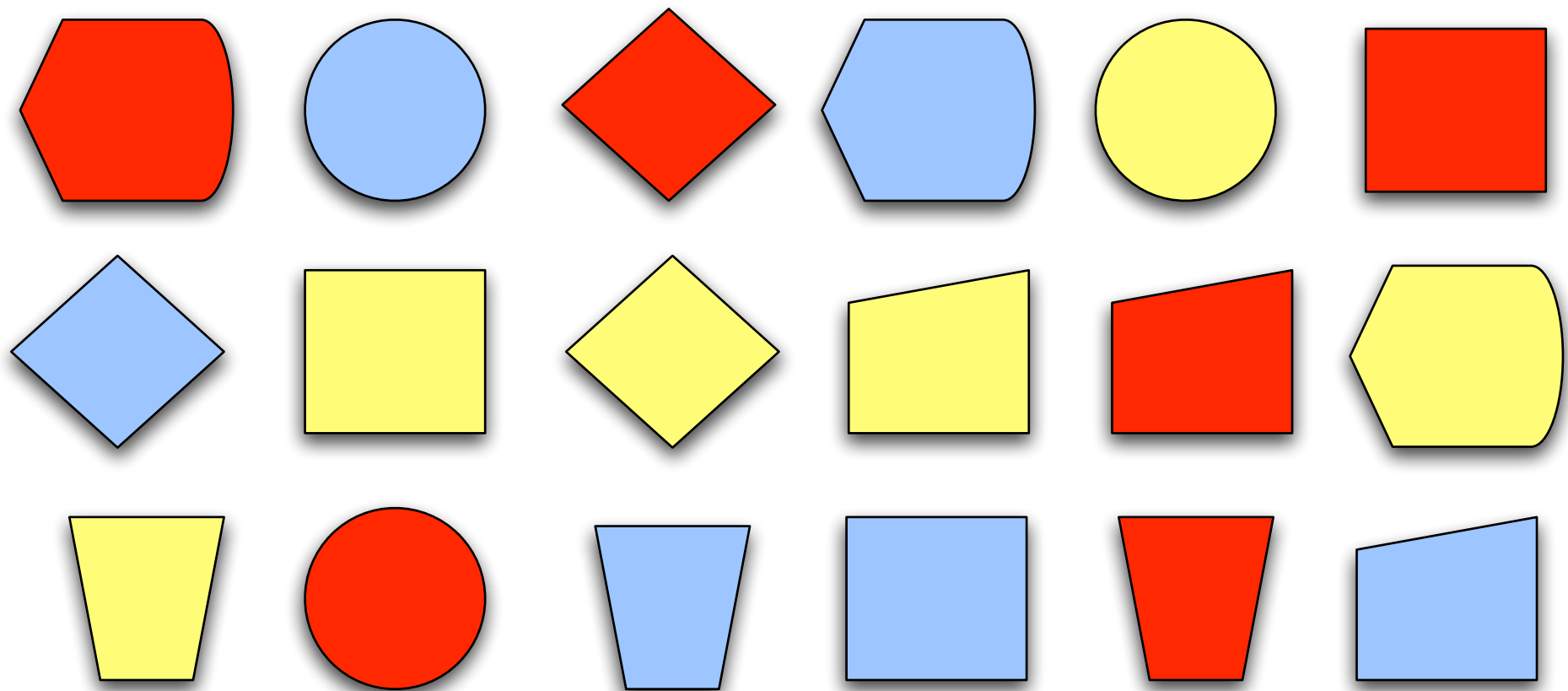
Application Architecture

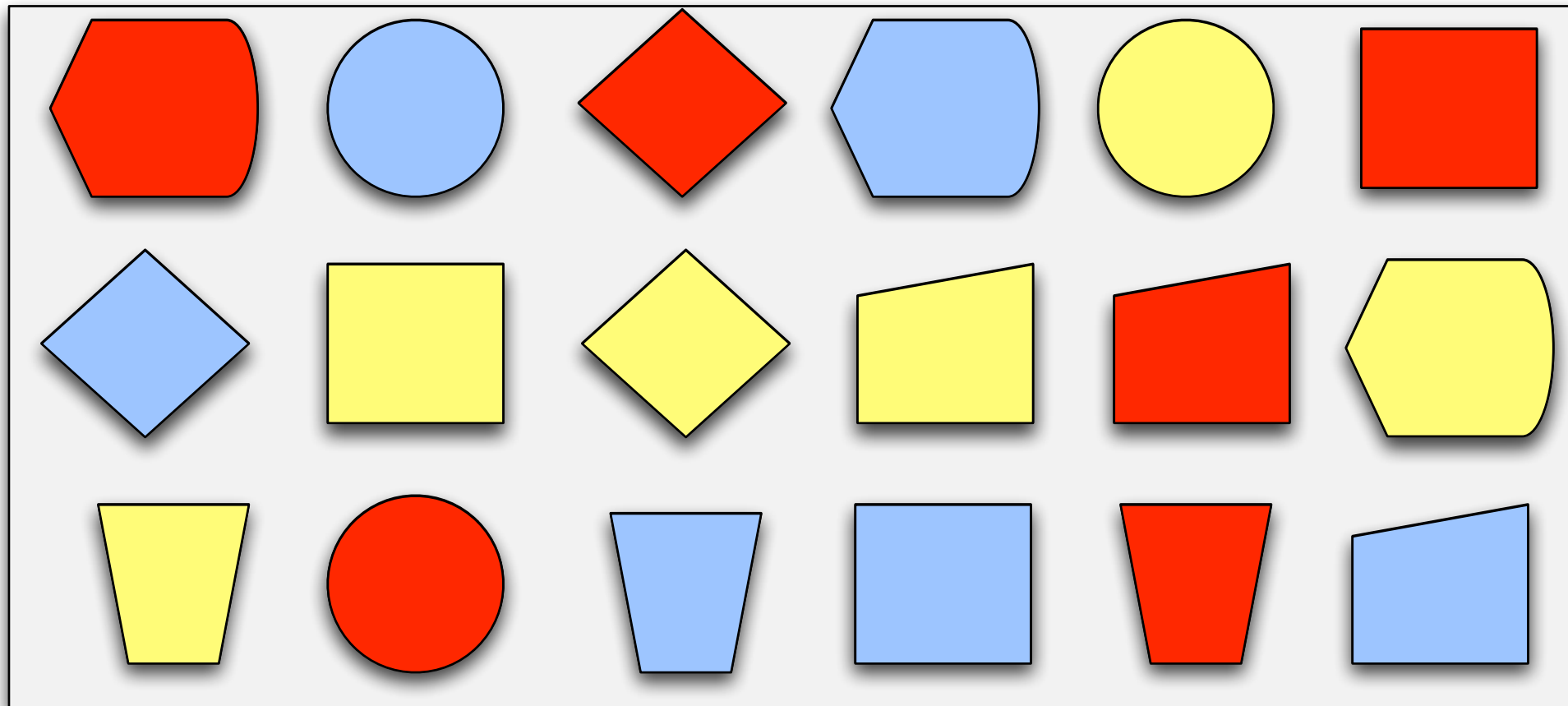
vs.

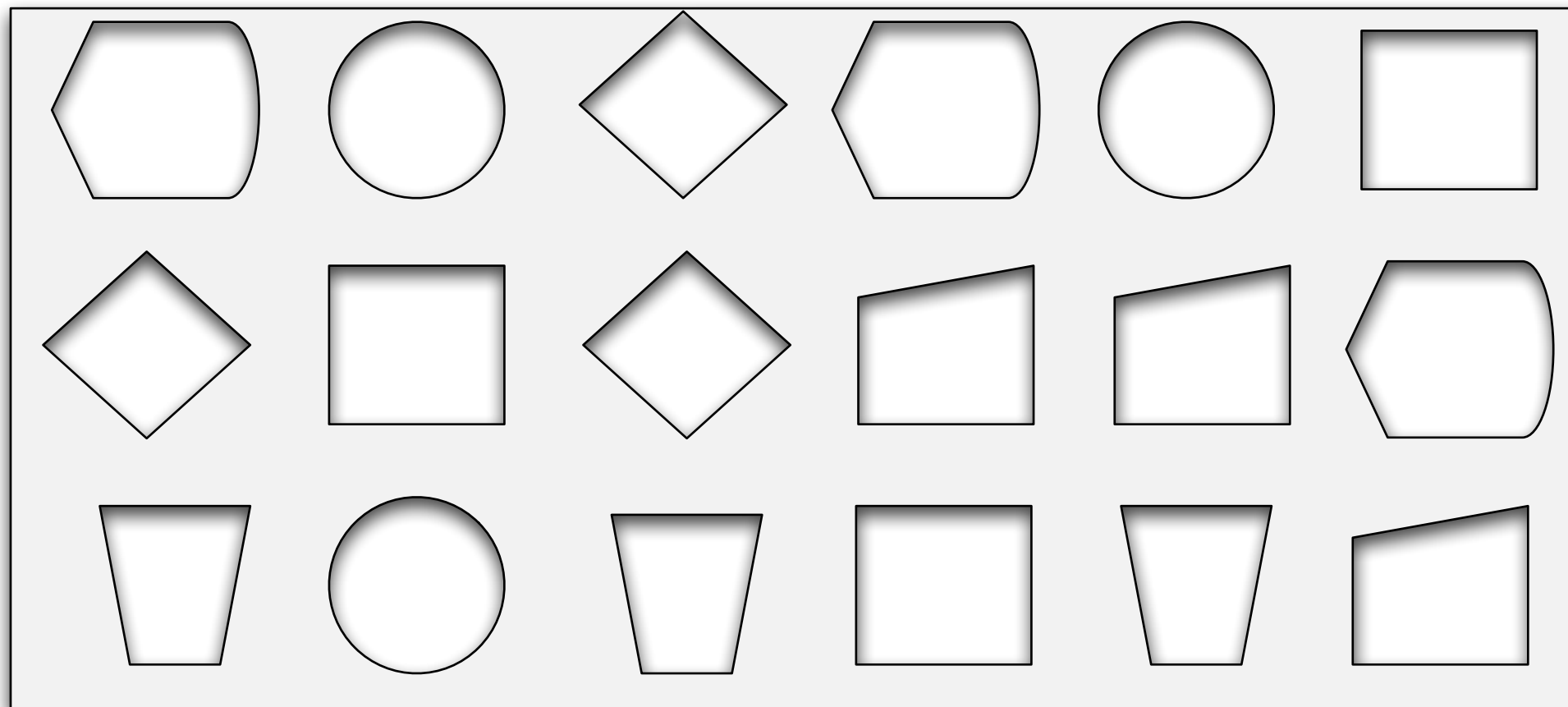
Integration Architecture

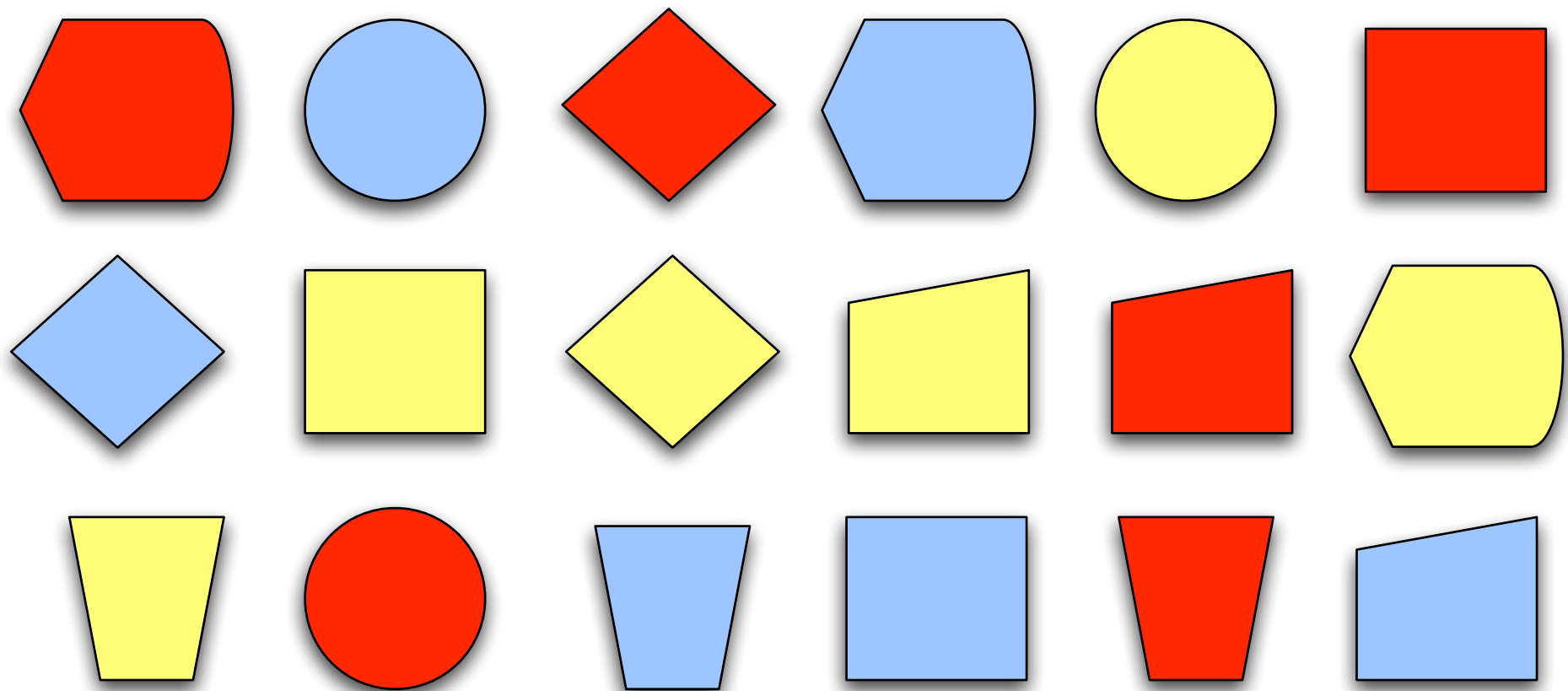


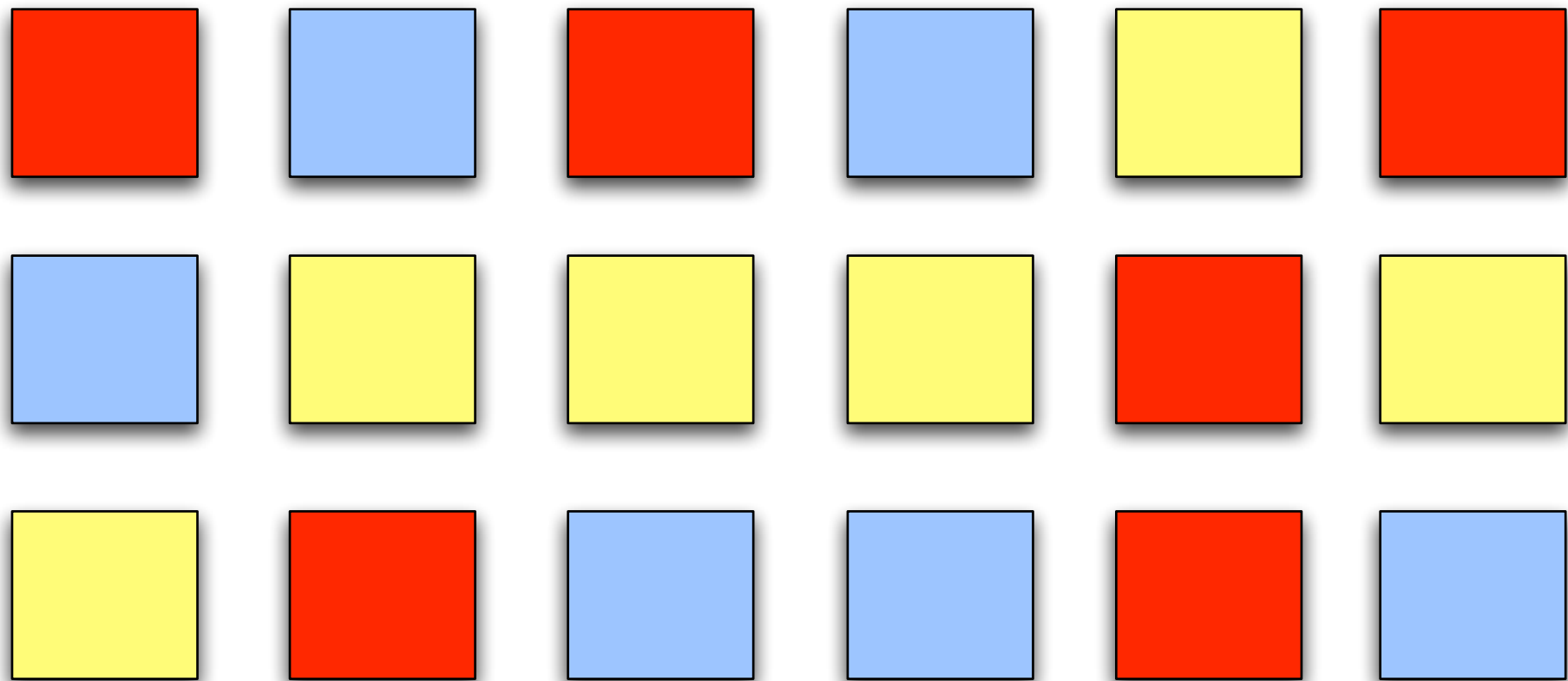


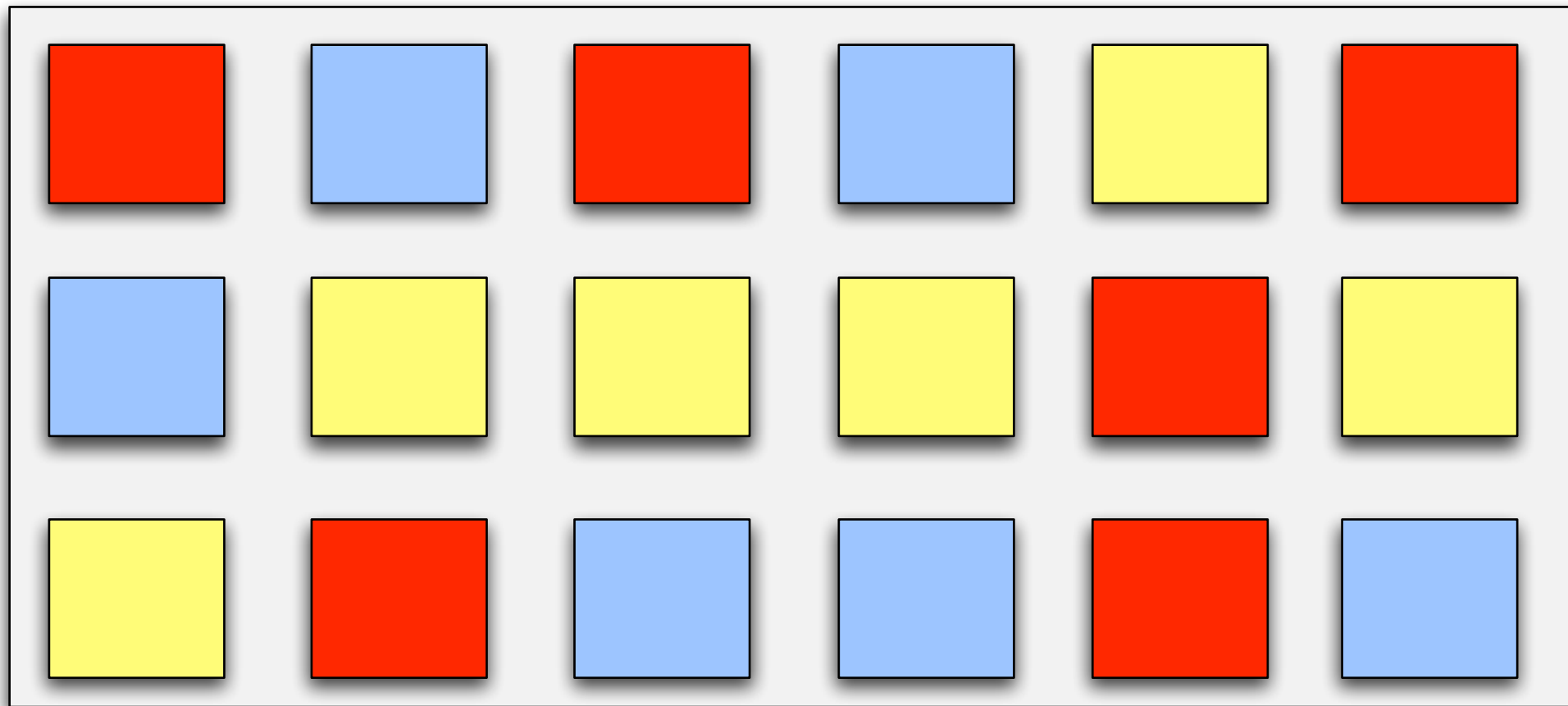


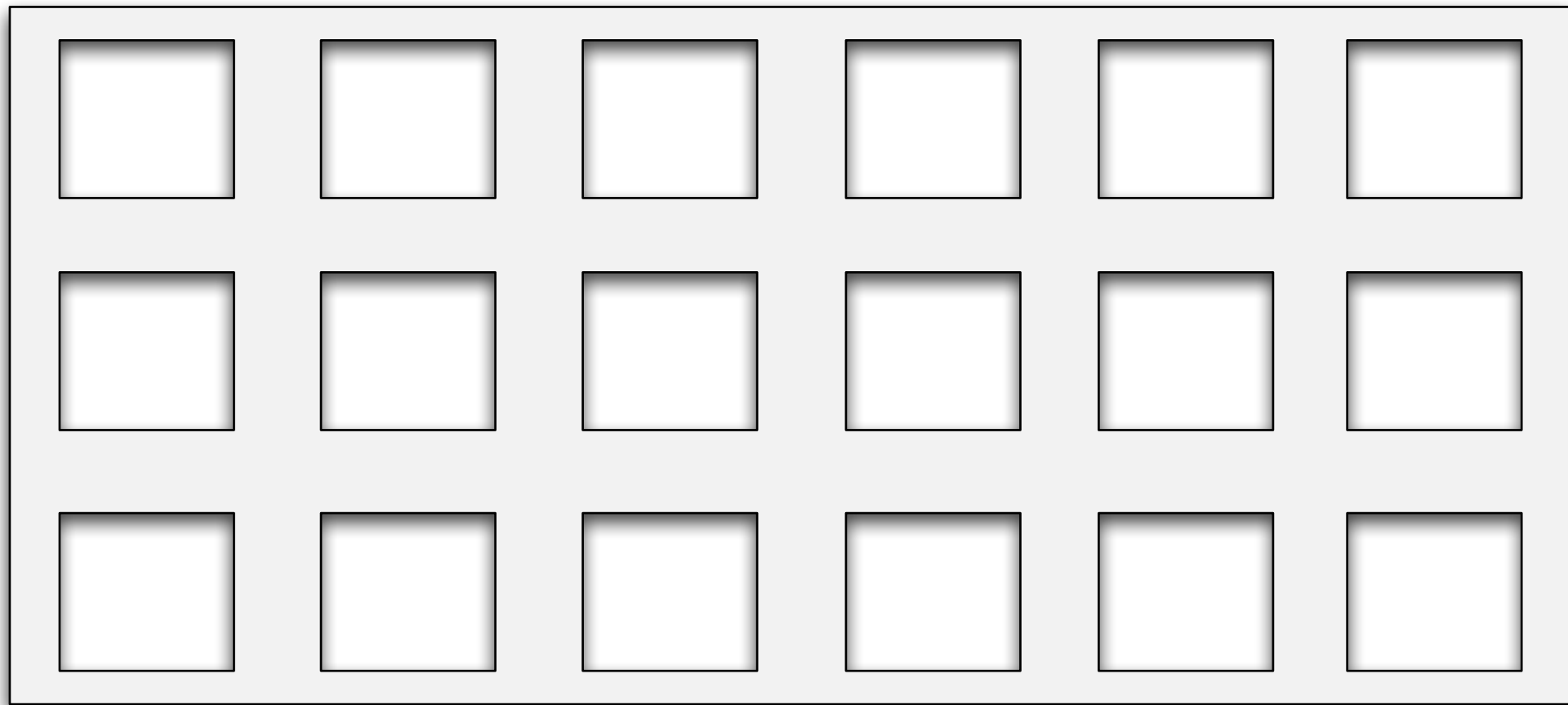


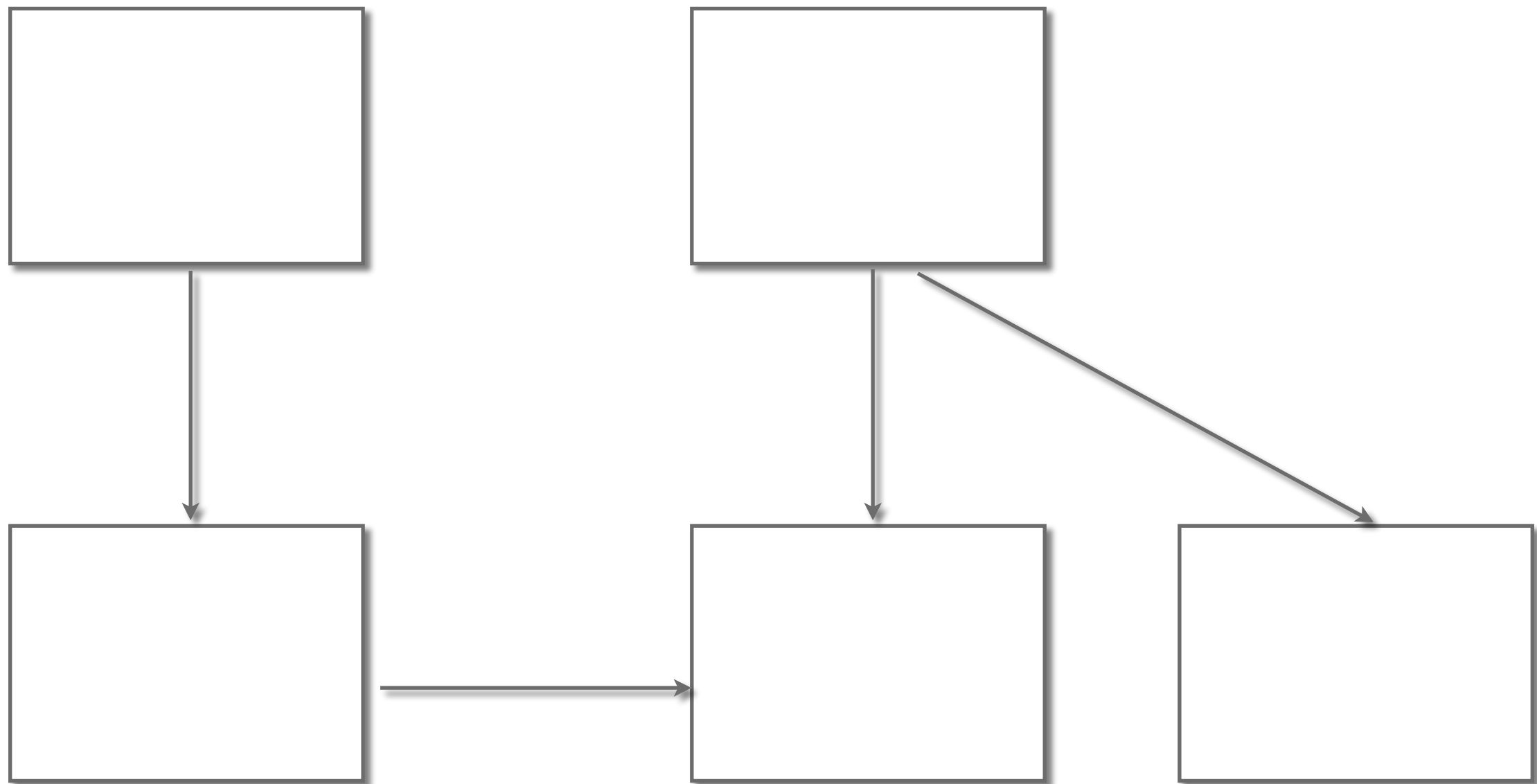


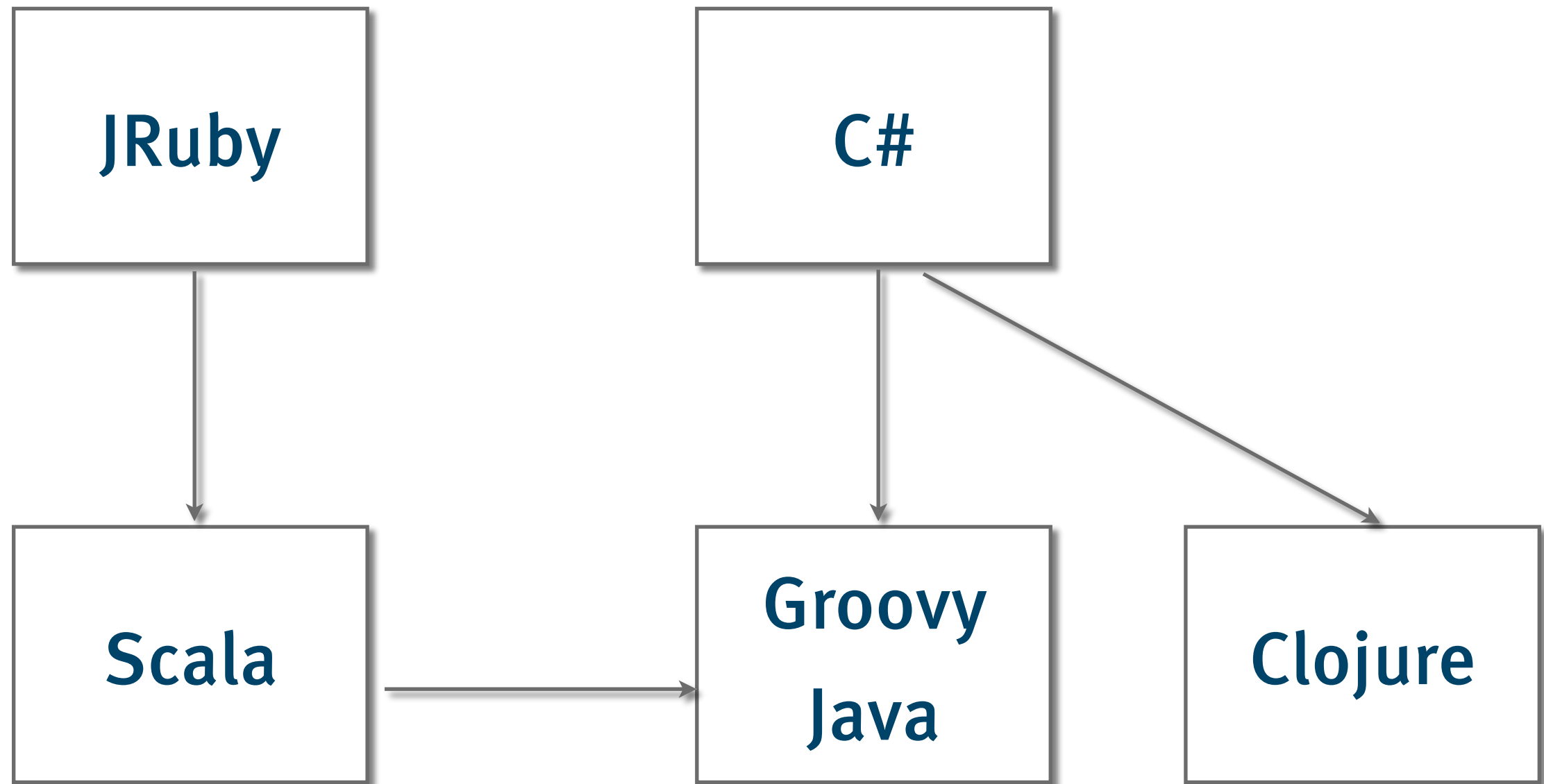












Modularization

Application Size	Modularization
1-50 LOC	1 file
50-500 LOC	few files, many functions
500-1000 LOC	library, class hierarchy
1000-2000 LOC	framework + application
>2000 LOC	more than one application

6. Distributed Systems

**Languages must not
influence distribution
architecture**

7. People

Skills

Community

Prejudice

Dependencies

Frustration

Motivation

Education

7. People

As usual, people matter most

Summary

- 1. Languages differ drastically**
- 2. No language is an island**
- 3. MLVMs enable diversity**
- 4. Nobody uses a single language**
- 5. Soft and hard spots suggest different languages**
- 6. Languages must not influence distribution architecture**
- 7. As usual, people matter most**



Q&A

Stefan Tilkov, @stilkov
stefan.tilkov@innoq.com
<http://www.innoq.com>
Phone: +49 170 471 2625

We will take care of it - personally.