Domain Specific Languages

Assembling Applications with Models, Patterns, Frameworks and Tools

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Using A Software Factory

Core Scenario

- Your company builds many similar applications
- No need to reinvent every time
- Can you put useful stuff together in a “package”?
  - What is the package?
  - What should be in it?
  - How should one use it?

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Your company builds client applications

- They run on desktops and laptops
- They share many common features
  - Interact with multiple services
  - Have to work offline
  - Must optimize interactions with slow services
  - Communicate with services in a secure fashion, both on internet and extranet
  - Support no-touch deployment and update
  - Support rich client interactions
  - Support context-sensitive user help
  - ...

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Your company has gained experience

- Best-practice patterns have emerged
  - Patterns of design
  - Patterns of activities
- Reusable assets have been produced
- Each subsequent client application looks more and more like the previous ones
  - An architecture has emerged

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You want to leverage your experience

- Defect levels are too high
- Hard to predict how variations in requirements will effect design, implementation, deployment
- Takes too long to train new developers
- Too many implementations of the same thing complicates maintenance
- Different instances have different characteristics (usability, reliability, performance, security)
- And there are not enough "Canadians" to go around

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You want to put your experience in a "box"

- Projects jump-start from a well defined baseline
- Project teams know what to use, when, why and how
- It’s at your fingertips in the development environment
- You don't have to be part of the “box”
  - Project teams can use its contents without you
- You want to harvest feedback from users so you can improve the “box”

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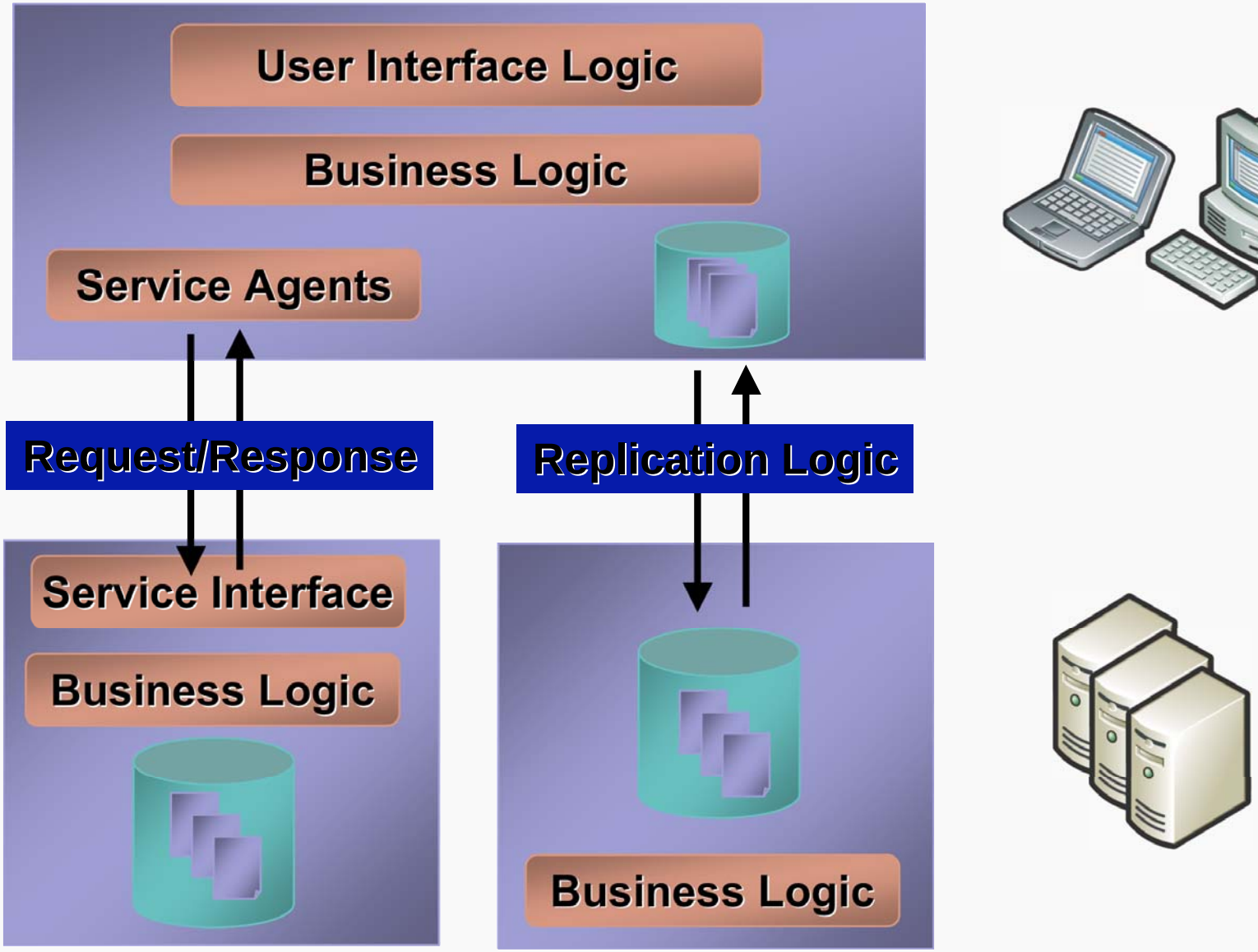
Client Application Example



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Existing Assets

Smart Client Architecture Guide

Enterprise Library

UIP Application Block

DSL SDK

Application Architecture for .NET

Updater Application Block

Offline Application Block

GAT

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What's A Factory?

- VS with the "box" installed
- Helps users to develop similar solutions
  - Automate development tasks
  - Reuse assets
  - Guide development process
  - Reference documentation
- Our factory helps users
  - Build wizard based UIP-based clients
  - Connect to services via Service Agents
    - Caching responses

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What's In A Factory?

- Software factory description (schema)
  - Defines contexts for delivering assets to developers
  - Describes the assets, how they are packaged into the factory, how they should be analyzed, customized and installed or included in the development environment, and how they should be used
  - Can be interpreted by
    - Users
    - Tools
- Structured collection of customizable assets (template)
  - Tools, templates, wizards, config files, application blocks, baseline architectures, patterns, snippets, feature models, documents, code samples, …

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Software Factories Vision

Software Development Is Craftsmanship

- Labor Intensive
- Hand stitched from scratch
- Generic Tools
- Generic Processes
- Minimal reuse

Overruns, defects, security holes, project failures

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Industrialization of Software Development

- Pattern for automating development
- Currently feasible only for broad domains
  - Platform vendors supply generic factories to the industry
- Make it feasible for narrower domains
  - Domain knowledge resides in user organizations
  - Provide more value for a smaller set of problems

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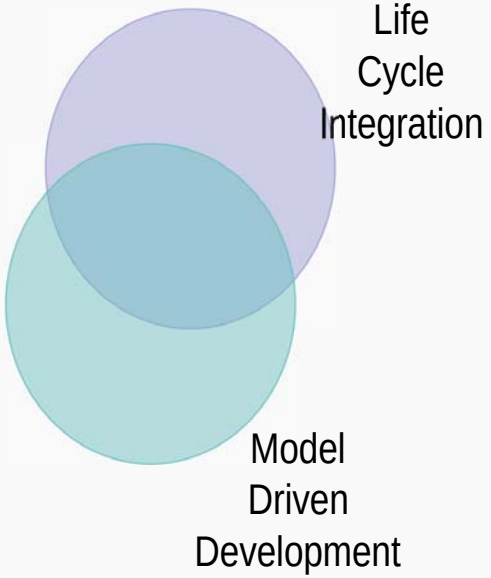
Model Driven Development

- Help developers provide advanced automation by creating small, focused custom languages that solve clearly identifiable problems facing analysts, architects, developers, testers and other participants, and custom tools that support them
- Integrate metadata, tasks and artifacts
  - from one life cycle phase, one part of a system, one level of abstraction
  - to other phases, other parts, other levels of abstraction



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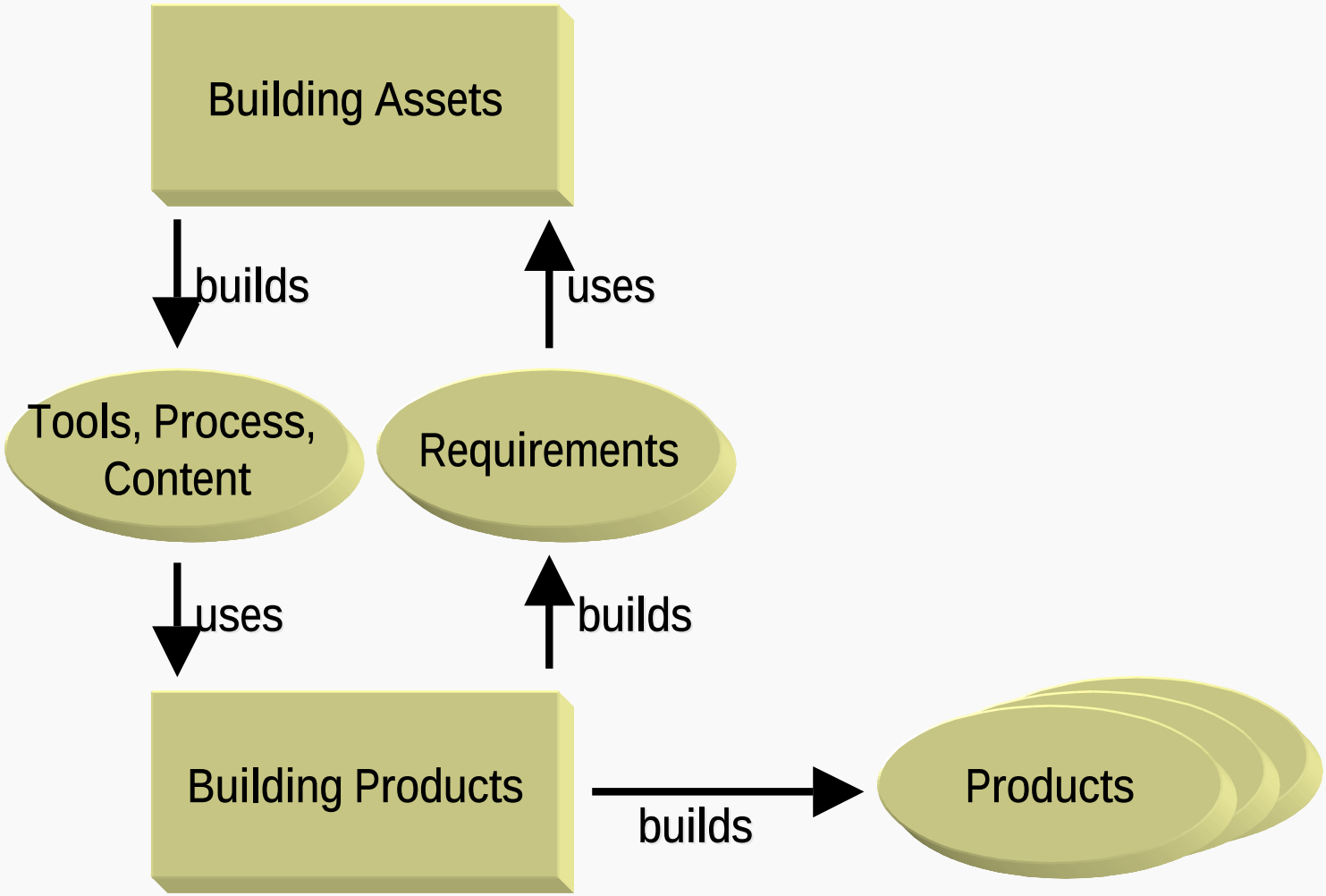
Software Product Lines



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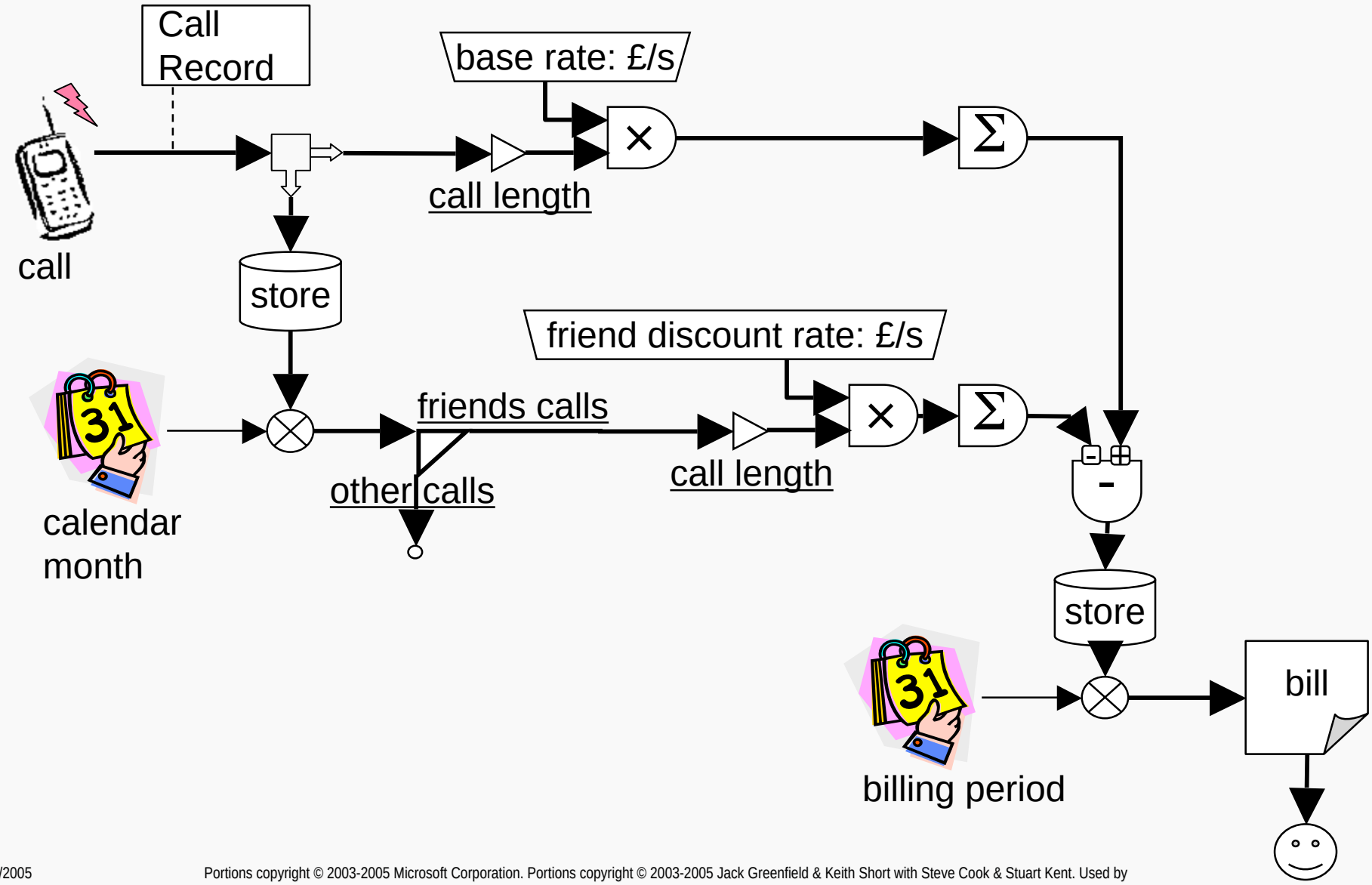
DSL Tools

Telephone billing language



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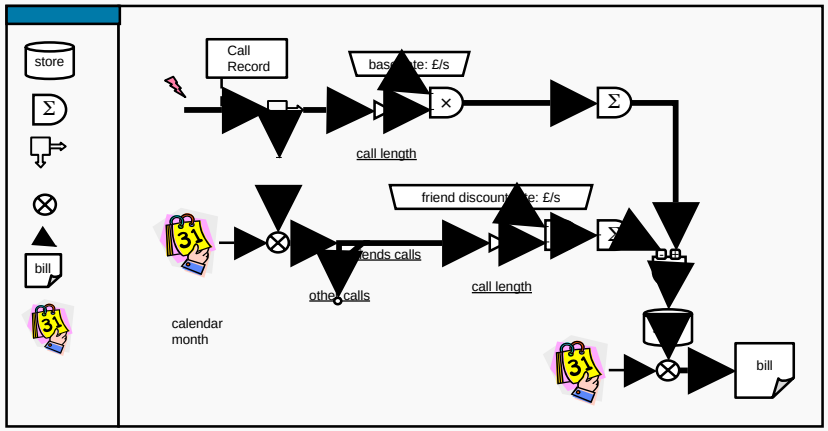
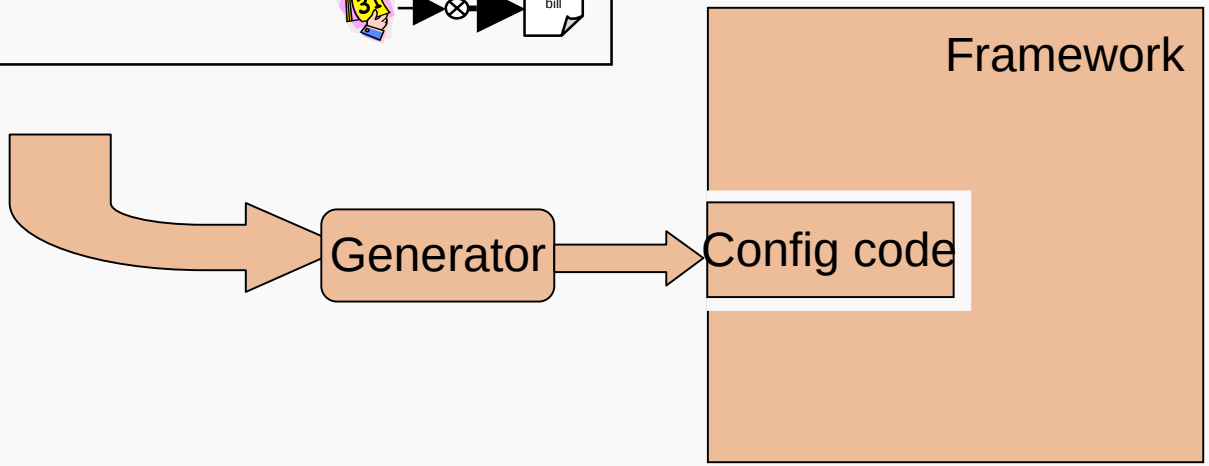
Using a Domain Specific Language





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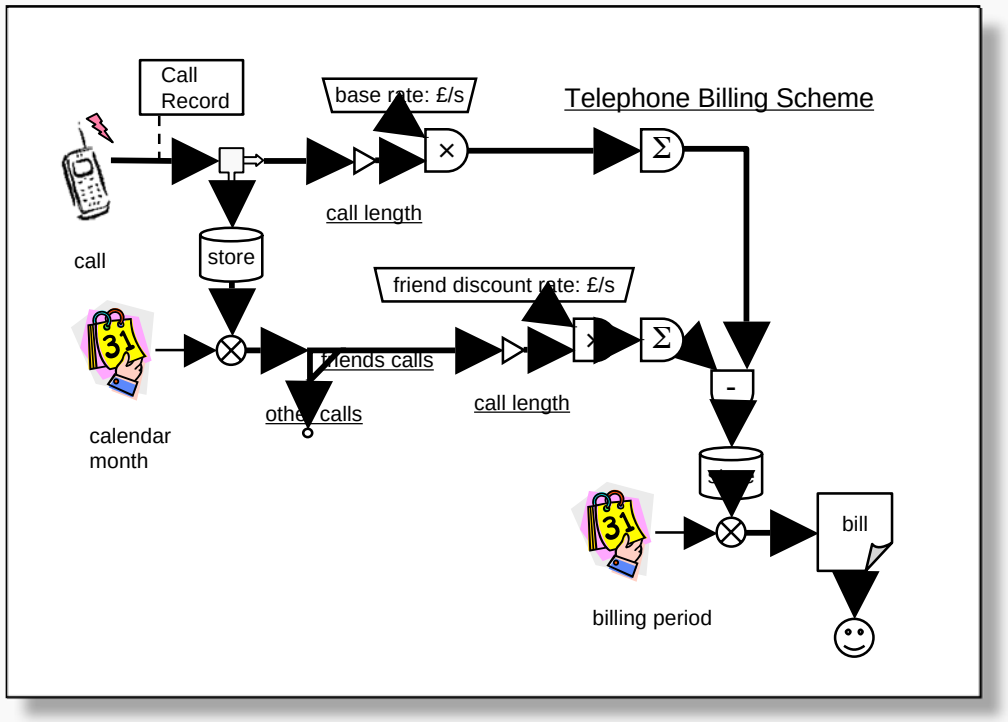
phone bill systems are Small Scale …

- if we have a **language** of phone billing



- and a **platform** to run it on

Phone billing engine

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Domain Specific Languages

- Small highly focused languages
  - Better integrated with development process
  - Designed for specific problems, platforms or tasks
- Many proven examples
  - SQL, GUI builders, HTML, regular expressions
- Remove complexity from the problem
  - Solution easier to understand and maintain
  - Encourage agility through rapid iteration

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DSL Tools Demonstration

Benefits of DSLs

- Notation is close to the domain
  - Encourages separation from implementation concerns
  - Can discuss with customer
- Agile
  - Easy and more reliable to change
  - DSL should be chosen to cover most variable aspects
- Good for product-line development
  - DSL covers a variable aspect;
    executing framework captures implementation patterns

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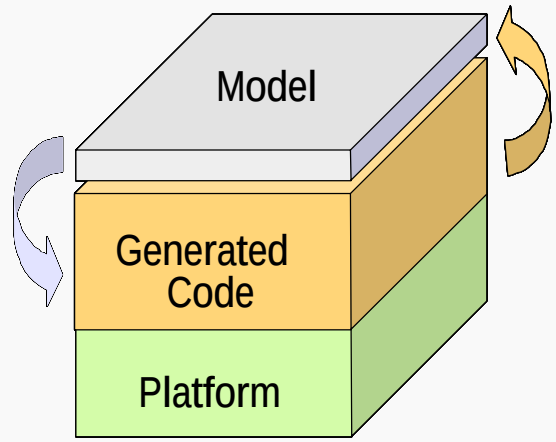
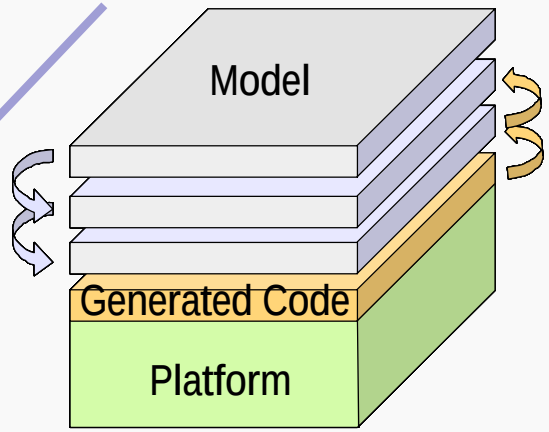
How To Build An Industrial Grade Designer

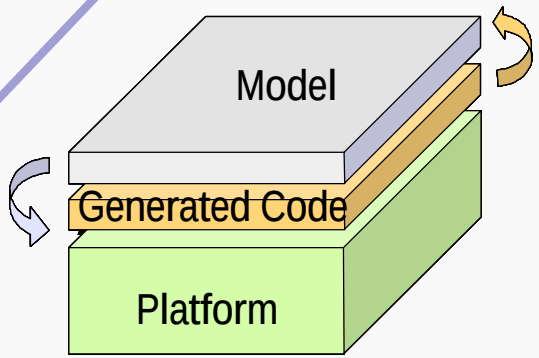
Effective Transformations



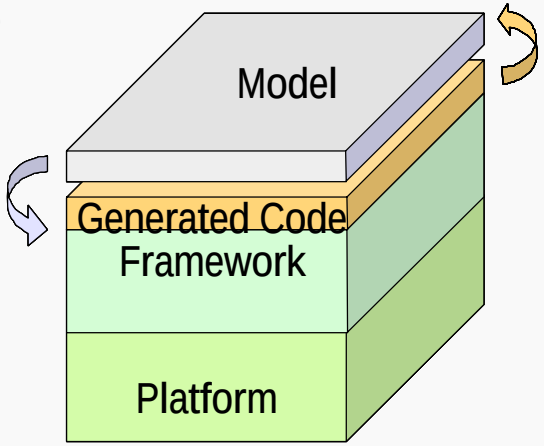
Old Case



Interrelated Models



Generate To Platform



Generate to Framework

DSLs

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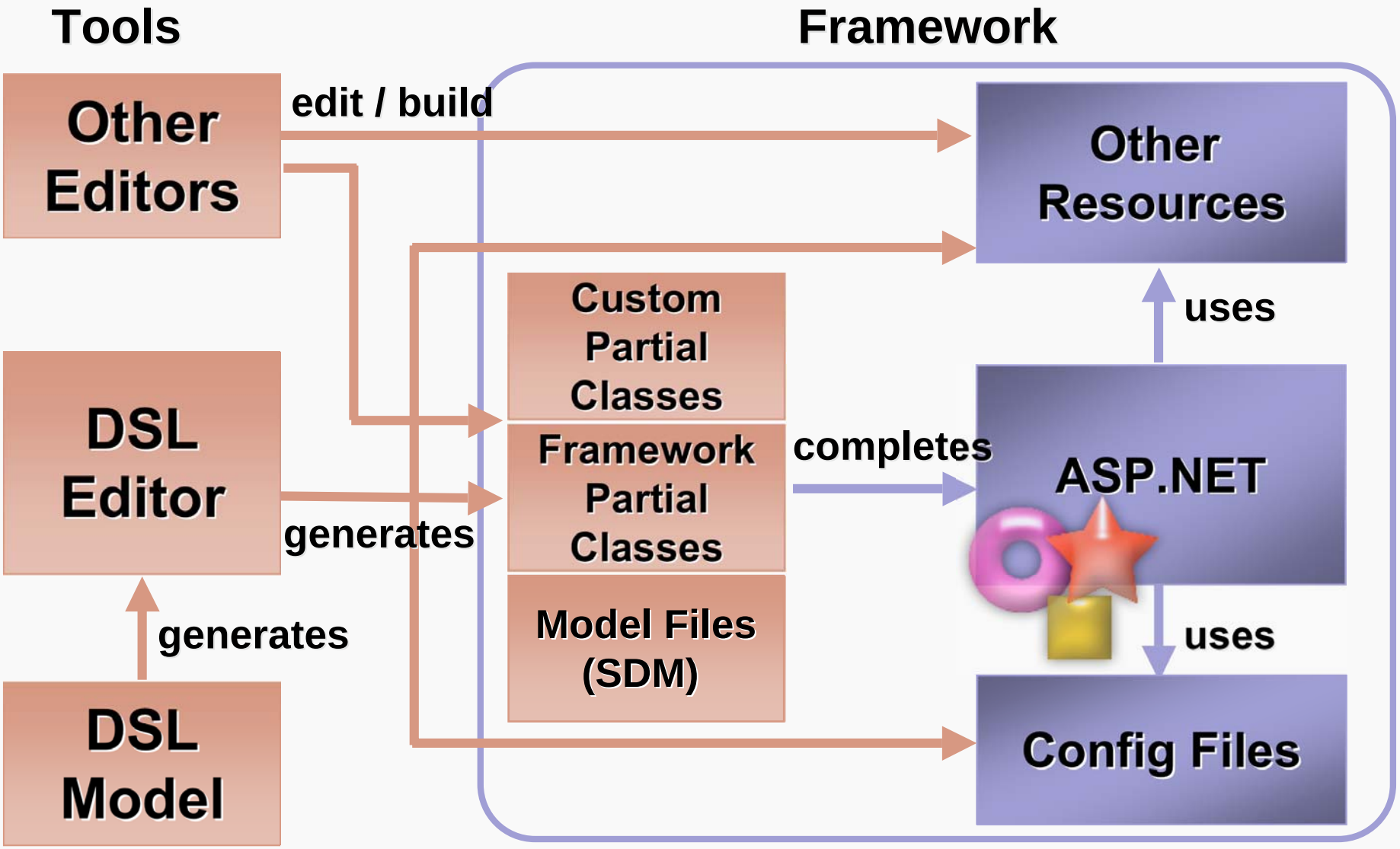
Models and Frameworks



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SUMMARY

- Motivate Software Factory Vision
- Refresh of Software Factories
- Define Domain Specific Languages
- Demonstrate Software Factory Technologies
  - Domain Specific Languages

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Resources

- Books
  - Software Factories by Jack Greenfield and Keith Short
- Websites
  - http://msdn.microsoft.com/architecture/softwarefactories
  - http://msdn.microsoft.com/vstudio/teamsystem
  - http://lab.msdn.microsoft.com/vs2005/teamsystem/workshop
- Newsgroups
  - Microsoft.private.whidbey.teamsystem.architect
  - Microsoft.private.whidbey.teamsystem.architect.modeling
- Email
  - keithsh@microsoft.com
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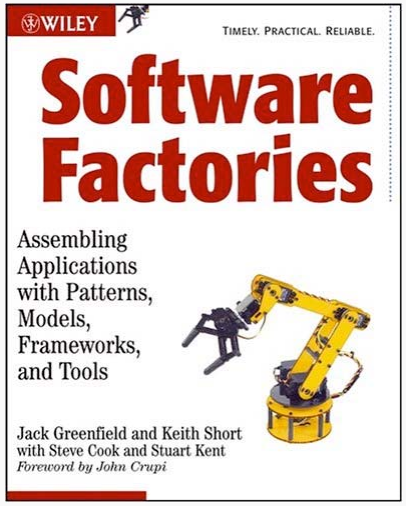

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Questions | Comments

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