Engineering Long-Lasting Software: An Agile Approach Using SaaS and Cloud Computing Beta Edition 0.9.0

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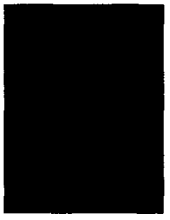

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To help understand the nature of engineering software, we contrast it with hardware engineering with regards to product lifetimes, development processes, productivity, and assurance. The similarities and differences led to popular processes for software development: Waterfall, Spiral, and Agile. We show the synergy between Software as a Service (SaaS), Cloud Computing, and Agile software development. We conclude with a tour of the remainder the book.

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Whether creating a new system or preparing to modify an existing one, understanding its architecture at multiple levels is essential. Happily, good software leverages patterns at many levels—proven solutions to similar architectural problems, adapted to the needs of a specific problem. Judicious use of patterns helps simplify design, reveal intent, and compose software components into larger systems. We'll examine the patterns present at various logical layers of SaaS apps, discuss why each pattern was chosen, and where appropriate, note the opportunity cost of not choosing the alternative. Patterns aren't perfect for every problem, but the ability to separate the things that change from those that stay the same is a powerful tool for organizing and implementing large systems.

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This quick introduction will get you up to speed on idiomatic Ruby, a highly productive scripting language. We focus on the unique productivity-enhancing features of Ruby that may be unfamiliar to Java programmers, and we omit many details that are well covered by existing materials. As with all languages, becoming truly comfortable with Ruby's powerful features will require going beyond the material in this introduction to the materials listed in Section 3.11.

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Rails is a Ruby-based framework that uses three patterns from Chapter 2 to organize SaaS apps: Model-View-Controller for the app as a whole, Active Record for models backed by a relational database in the persistence tier, and Template View for constructing HTML pages. For conciseness, DRYness and productivity, Rails makes pervasive use of Ruby's reflection and metaprogramming (Chapter 3) as well as ***convention over configuration,*** a design paradigm that automates some configuration based on the names of data structures and variables. Although Rails presents a lot of machinery for the simple examples developed in this chapter, you will quickly "grow into" these features as your apps become more sophisticated.

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The first step in the Agile cycle, and often the most difficult, is a dialogue with each of the stakeholders to understand the requirements. We first derive ***user stories,*** which are short narratives each describing a specific interaction between some stakeholder and the application. The ***Cucumber*** tool turns these stylized but informal English narratives into acceptance and integration tests. As SaaS usually involves end-users, we also need a user interface. We do this with *low-fidelity (Lo-Fi)* drawings of the Web pages and combine them into ***storyboards*** before creating the UI in HTML.

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This chapter explores three sets of mechanisms for DRYing out your code, thereby making it more concise, beautiful and maintainable. Model validations and controller filters centralize what invariants must hold in order for a model object to be valid (for example, a movie must have a nonblank title) or for a controller action to proceed (for example, the user must be logged in as an admin). ActiveRecord Associations use Ruby language features to represent and manipulate relationships among different types of ActiveRecord models, while using relational-database functionality to represent these relationships as foreign-key associations. Finally, scopes let you encapsulate different ActiveRecord queries into composable "building blocks" that you can easily reuse to add new query functionality to your app. In each case, tastefully-chosen language features and framework architecture support DRY and concise app code.

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Out of every dollar spent on software, 36% is spent on enhancements, 10% on fixing bugs, 11% on adapting to environmental changes such as new library versions or API changes, and 3% on ***refactoring*** to make the software more maintainable. In total, therefore, about 60% of software expenses is devoted to software maintenance, so your first job is more likely to involve improving existing code than creating a brand-new system from a clean slate. In Chapters 5 and 6 we looked at disciplined ways to evolve new code. Although thorough formal documentation of legacy systems may be lacking or inaccurate, the Agile techniques we already know can be pressed into service to help understand the structure of legacy software and create a foundation for extending and modifying it with confidence. We will describe what good code looks like and why, and show how to apply refactoring techniques to legacy code both to make it more testable (and therefore modifiable with confidence) and to leave it in better shape than we found it for the next developers.

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Programming is now primarily a team sport, and this chapter covers techniques that can help teams succeed. Everyone on the team must to agree on dividing up work, how to estimate the difficulty of the work to produce a schedule, how to correct the schedule when actual progress differs from predicted progress, and know where and how to check in code. Velocity-based iteration planning, supported by tools such as ***Pivotal Tracker,*** address the managing and scheduling tasks. ***Pair programming,*** *design reviews,* and *code reviews* can improve software quality. Good version control practices, supported by tools such as Git, address code management.

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Besides reusability, programmer productivity requires concise, readable code with minimal clutter. In this chapter, we describe some concrete guidelines for making your class architecture DRY and maintainable: the SOLID principles of object-oriented design—Single Responsibility, Open/Closed, Liskov Substitution, Injection of Dependencies, and Demeter—and some design patterns supporting them. We will learn about design smells and metrics that may warn you of violations of SOLID, and explore some refactorings to fix those problems. In some cases, those refactorings will lead us to one of a collection a design patterns—proven "templates" for class interaction that capture successful structural solutions to common software problems.

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Proper use of JavaScript enhances the user experience for newer browsers without excluding older browsers or those in which JavaScript is disabled. The Web's client-side

programming language has a bad reputation because most people who use it lack the programming experience to use its unusual features to write beautiful code. Fortunately, your Ruby knowledge will let you grasp JavaScript's unusual features easily, your SaaS knowledge will let you quickly understand frameworks like jQuery, and your TDD and BDD experience will apply directly to using Jasmine for test-driven JavaScript development.

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