Chapter 1

Introduction to Systems Analysis and Design

Introduction

THE SYSTEMS DEVELOPMENT LIFE CYCLE

Planning

Analysis

Design

Implementation

SYSTEMS DEVELOPMENT METHODOLOGIES

Structured Design 6 Rapid Application Development (RAD)

Agile Development

Selecting the Appropriate Development Methodology

TYPICAL SYSTEMS ANALYST ROLES AND SKILLS

Business Analyst 18 Systems Analyst

Infrastructure Analyst

Change Management Analyst

Project Manager

BASIC CHARACTERISTICS OF OBJECT-ORIENTED SYSTEMS

Classes and Objects

Methods and Messages

Encapsulation and Information Hiding

Inheritance

Polymorphism and Dynamic Binding

OBJECT-ORIENTED SYSTEMS ANALYSIS AND DESIGN (OOSAD)

Use-Case Driven

Architecture-Centric

Iterative and Incremental

Benefits of Object-Oriented Systems Analysis and Design

THE UNIFIED PROCESS

Phases

Workflows

Extensions to the Unified Process

THE UNIFIED MODELING LANGUAGE

APPLYING THE CONCEPTS AT PATTERSON

SUPERSTORE

CHAPTER REVIEW

Chapter 2

Project Management

Introduction

PROJECT IDENTIFICATION

System Request

Feasibility ANALYSIS

Technical Feasibility

Economic Feasibility

Organizational Feasibility

PROJECT SELECTION

TRADITIONAL PROJECT MANAGEMENT TOOLS

Work Breakdown Structures

Gantt Chart

Network Diagram

PROJECT EFFORT ESTIMATION

CREATING AND MANAGING THE WORKPLAN

Evolutionary Work Breakdown

Structures and Iterative Workplans

Managing Scope

Timeboxing

Refining Estimates

Managing Risk

STAFFING THE PROJECT

Characteristics of a Jelled Team

Staffing Plan

Motivation

Handling Conflict

ENVIRONMENT AND INFRASTRUCTURE MANAGEMENT

CASE Tools

Standards

Documentation

APPLYING THE CONCEPTS AT PATTERSON

SUPERSTORE 80 CHAPTER REVIEW

PART ONE

ANALYSIS MODELING

Chapter 3

Requirements Determination

INTRODUCTION

REQUIREMENTS DETERMINATION

Defining a Requirement

Requirements Definition

Determining Requirements

Creating a Requirements Definition

Real-World Problems with Requirements Determination

REQUIREMENTS ANALYSIS STRATEGIES

Problem Analysis

Root Cause Analysis

Duration Analysis

Activity-Based

Costing

Informal Benchmarking

Outcome Analysis

Technology Analysis

Activity Elimination

REQUIREMENTS-GATHERING TECHNIQUES

Interviews

Joint Application Development (JAD)

Questionnaires

Document Analysis

Observation

Selecting the Appropriate Techniques

ALTERNATIVE REQUIREMENTS DOCUMENTATION TECHNIQUES

Concept Maps

User Stories

THE SYSTEM PROPOSAL

APPLYING THE CONCEPTS AT PATTERSON

SUPERSTORE

CHAPTER REVIEW

Chapter 4

Business Process and Functional Modeling

Introduction

BUSINESS PROCESS IDENTIFICATION WITH USE CASES AND USE-CASE

DIAGRAMS

Elements of Use-Case Diagrams

Identifying the Major Use Cases

Creating a Use-Case Diagram

BUSINESS PROCESS MODELING WITH ACTIVITY DIAGRAMS

Elements of an Activity Diagram

Guidelines for Creating Activity

Diagrams

Creating Activity Diagrams

BUSINESS PROCESS DOCUMENTATION WITH USE CASES AND USE-CASE DESCRIPTIONS

Types of Use Cases

Elements of a Use-Case Description

Guidelines for Creating Use-Case

Descriptions

Creating Use Case Descriptions

VERIFYING AND VALIDATING THE BUSINESS PROCESSES AND FUNCTIONAL MODELS

Verification and Validation through

Walkthroughs

Functional Model Verification and Validation

APPLYING THE CONCEPTS AT PATTERSON

SUPERSTORE

CHAPTER REVIEW

Chapter 5

Structural Modeling

Introduction

STRUCTURAL MODELS

Classes, Attributes, and

Operations

Relationships

OBJECT IDENTIFICATION

Textual Analysis

Brainstorming

Common Object Lists

Patterns

CRC CARDS

Responsibilities and Collaborations

Elements of a CRC Card

Role-Playing CRC Cards with Use Cases

CLASS DIAGRAMS

Elements of a Class Diagram

Simplifying Class Diagrams

Object Diagrams

CREATING STRUCTURAL MODELS USING CRC CARDS AND CLASS DIAGRAMS Campus

Housing Example

Library Example

Verifying and Validating the Structural

Model

Applying the Concepts at Patterson

Superstore

Chapter Review

Chapter 6

Behavioral Modeling

Introduction

Behavioral Models

Interaction Diagrams

Objects, Operations, and Messages

Sequence Diagrams

Communication Diagrams

Behavioral State Machines

States, Events, Transitions, Actions, and

Activities Elements of a Behavioral State Machine Creating a

Behavioral State Machine

Crude Analysis

Verifying and Validating the Behavioral

Model

Applying the Concepts at Patterson

Superstore

Chapter Review

PART TWO

DESIGN MODELING

Chapter

Moving on to Design

Introduction

Verifying and Validating the Analysis Models

Balancing Functional and Structural

Models

Balancing Functional and Behavioral

Models

Balancing Structural and Behavioral

Models

Summary

Evolving the Analysis Models into Design Models

Factoring

Partitions and Collaborations

Layers

Packages and Package Diagrams

Guidelines for Creating Package

Diagrams

Creating Package Diagrams

Verifying and Validating Package Diagrams

Design Strategies

Custom Development

Packaged Software

Outsourcing

Selecting a Design Strategy

Selecting an Acquisition Strategy

Alternative Matrix

Applying the Concepts at Patterson

Superstore

Chapter Review

Chapter 8

Class and Method Design 280

Introduction

Review of the Basic Characteristics of Object Orientation

Classes, Objects, Methods, and Messages

Encapsulation and Information Hiding

Polymorphism and Dynamic Binding

Inheritance

Design Criteria

Coupling

Cohesion

Connascence

Object Design Activities

Adding Specifications

Identifying Opportunities for Reuse

Restructuring the Design

Optimizing the Design

Mapping Problem-Domain Classes to Implementation Languages

Constraints and Contracts

Types of Constraints

Elements of a Contract

Method Specification

General Information

Events

Message Passing

Algorithm Specifications

Example

Verifying and Validating Class and Method Design

Applying the Concepts at Patterson

Superstore

Chapter review

Chapter 9

Data Management Layer Design

Introduction

Object Persistence Formats

Sequential and Random Access Files

Relational Databases

Object-Relational Databases

Object-Oriented Databases

NoSQL Data Stores

Selecting an Object Persistence Format

Mapping Problem Domain Objects to Object Persistence Formats

Mapping Problem Domain Objects to an

OODBMS Format Mapping Problem Domain Objects to an

ORDBMS Format

Mapping Problem Domain Objects to a RDBMS Format

Optimizing Rdbms-Based Object Storage

Optimizing Storage Efficiency

Optimizing Data Access Speed

Estimating Data Storage Size

Designing Data Access and Manipulation

Classes

Nonfunctional Requirements and Data

Management Layer Design

Verifying and Validating the Data

Management Layer

Applying the Concepts at Patterson

Superstore

Chapter Review

Chapter 70

Human-Computer Interaction Layer Design

Introduction

Principles for User Interface Design

Layout

Content Awareness

Aesthetics

User Experience

Consistency

Minimizing User Effort

User Interface Design Process

Use Scenario Development

Navigation Structure Design

Interface Standards Design

interface Design Prototyping

Interface Evaluation

Common Sense Approach to User Interface Design

Navigation Design

Basic Principles

Types of Navigation Controls

Messages

Navigation Design Documentation

Input Design

Basic Principles

Types of Inputs

Input Validation

Output Design

Basic Principles

Types of Outputs

Media

Mobile Computing and User Interface

Design

Social Media and User Interface

Design

Games, Multi-Dimensional Information Visualizations, and

Immersive Environments

Games, Gamification, and User Interface Design

Multidimensional Information Visualization

Design

User Interface Design and Immersive Environments

International and Cultural Issues and User Interface Design

Multilingual Requirements

Color

Cultural Differences

Nonfunctional Requirements And Human-Computer Interaction

Layer Design

Applying The Concepts At Patterson

Superstore

Chapter review

Chapter 11

Physical Architecture Layer Design

Introduction

Elements of the Physical Architecture Layer

Architectural Components

Server-Based Architectures

Client-Based Architectures

Client-Server Architectures

Client-Server Tiers

Selecting a Physical Architecture

Cloud Computing

Ubiquitous Computing and the Internet

of Things

Green IT

Infrastructure Design

Deployment Diagram

Network Model

Hardware and System Software

Specifications 438

Nonfunctional Requirements and Physical Architecture Layer Design

Operational Requirements

Performance Requirements

Security Requirements

Cultural and Political Requirements

Synopsis

Verifying and Validating the Physical

Architecture Layer

Applying the Concepts at Patterson

Superstore

Chapter Review

PART THREE

CONSTRUCTION, INSTALLATION, AND OPERATIONS

Chapter 12

Construction

Introduction

Managing Programming

Assigning Programmers

Coordinating Activities

Managing the Schedule 4

Cultural Issues

Developing Documentation

Types of Documentation

Designing Documentation Structure

Writing Documentation Topics

Identifying Navigation Terms

Designing Tests

Testing and Object Orientation

Test Planning

Unit Tests

Integration Tests

System Tests

Acceptance Tests 4

Applying the Concepts at Patterson

Superstore

Chapter Review

Chapter 13

Installation and Operations

Introduction

Cultural Issues and Information

Technology Adoption

Conversion

Conversion Style

Conversion Location

Conversion Modules

Selecting the Appropriate Conversion Strategy

Change Management

Understanding Resistance to Change

Revising Management Policies

Assessing Costs and Benefits 492

Motivating Adoption

Enabling Adoption: Training

Post-Implementation Activities

System Support

System Maintenance

Project Assessment

Applying the Concepts at Patterson

Superstore

Chapter Review

Index