SYSTEM AND SOFTWARE
DESIGN DESCRIPTION (SSDD) TEMPLATE
(Incorporating Architectural Views and Detailed Design Criteria)
Version A.2, November 2010
FOREWORD

This template was created to provide system and software development projects with a model System and Software Design Description (SSDD) that incorporates both architectural views and detailed design criteria. The template is based on work compiled by Dr. Paul Oman from a large collection of software engineering design document standards discussed in Section 1.5. It has been edited and updated by Dr. Clint Jeffery for use in UI CS 383.

The SSDD template begins on the next page. Just throw away this page and enter your project specifications into the following template. Don't forget to change the headers and footers as necessary. The following conventions are used to guide you in developing your SSDD:

[Text] **Replace** this text with your project design text.

text in italics   Notes/instructions to the author. **Delete in your finished document.**

University of Idaho
Open Space. Open Minds.

SYSTEM AND SOFTWARE DESIGN DESCRIPTION (SSDD): Incorporating Architectural Views and Detailed Design Criteria FOR

[state program/system name here]

Version [[insert version number]]
[[insert date]]

Prepared for:
[state customer name(s) here]

Prepared by:
[insert your name(s)]
University of Idaho
Moscow, ID 83844-1010

CS383 SSDD
RECORD OF CHANGES (Change History)

Change Number	Date com- pleted	Location of change (e.g., page or figure #)	A M D	Brief description of change	Approved by (initials)	Date approved

A - ADDED M - MODIFIED D – DELETED

[put program /system name here]
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Section Page

1 INTRODUCTION

This section of this document should introduce this document and its audience, and the project, the system, and the software object of this SSDD. For compliance with ISO/IEC 42010:2007 (§5.1) (and ISO/IEC 12207:2008) at a minimum the following information shall be included in this SSDD document: Date of Document Issue, Document Status, Document Issuing Organization, Document Change History, Document Summary, Document Scope, Document Context, Glossary, and References.

1.1 IDENTIFICATION

This subsection shall contain a full identification of this document, and the system and software to which this document applies, including, as applicable, identification number(s), title(s), abbreviation(s), version number(s) for the document, the system, and the software, and software release number(s).

[Insert text here.]

1.2 DOCUMENT PURPOSE, SCOPE, AND INTENDED AUDIENCE

This subsection shall contain a statement on the purpose of this document, the scope or context of the document, and the intended audience.

1.2.1 Document Purpose

[Insert text here.]

1.2.2 Document Scope and/or Context

[Insert text here.]

1.2.3 Intended Audience for Document

[Insert text here.]

1.3 SYSTEM AND SOFTWARE PURPOSE, SCOPE, AND INTENDED USERS

This subsection shall contain a statement on the purpose of this system and software, the scope or context of the system and software, and the intended users of the system and software. The subsection shall describe the system boundaries and the software boundaries, both with respect to their containing system and other systems of interest. It shall be clear from this section: 1) what is the relationship of other systems-of-interest with the system described in this document and 2) what is the relationship between the system and the particular software described in this SSDD.

1.3.1 System and Software Purpose

[Insert text here.]

1.3.2 System and Software Scope/or Context

[Insert text here.]

1.3.3 Intended Users for the System and Software

[Insert text here.]

1.4 DEFINITIONS, ACRONYMS, AND ABBREVIATIONS

This section shall list and define all special terms, acronyms and abbreviations used throughout this document. A tabular form is preferable, but not mandatory.

Term or Acronym	Definition
Acquirer	The person, team, or organization that pursues a system or software product or service from a supplier. The acquirer may be a buyer, customer, owner, purchaser, or user. ISO/IEC 42010:2007 (§3.1).
AD	Architectural Description: "A collection of products to document an architecture" ISO/IEC 42010:2007 (§3.4).
Alpha test	Limited release(s) to selected, outside testers
Architect	"The person, team, or organization responsible for systems architecture" ISO/IEC 42010:2007 (§3.2).
Architectural Description	(AD) "A collection of products to document an architecture" ISO/IEC 42010:2007 (§3.4).
Architectural View	"A representation of a whole system from the perspective of a related set of concerns" ISO/IEC 42010:2007 (§3.9).
Architecture	"The fundamental organization of a system embodied in its components, their relationships to each other, and to the environment, and the principles guiding its design and evolution" ISO/IEC 42010:2007 (§3.5).
Beta test	Limited release(s) to cooperating customers wanting early access to developing systems
Design Entity	"An element (component) of a design that is structurally and functionally distinct from other elements and that is separately named and referenced" IEEE STD 1016-1998 (§3.1).
Design View	"A subset of design entity attribute information that is specifically suited to the needs of a software project activity" IEEE STD 1016-1998 (§3.2).
Final test	aka, Acceptance test, release of full functionality to customer for approval
DFD	Data Flow Diagram
SDD	Software Design Document, aka SDS, Software Design Specification
Software Design Description	"A representation of a software system created to facilitate analysis, planning, implementation, and decision making, A blueprint or model of a software system. The SDD is used as the primary medium for communicating software design information" IEEE STD 1016-1998 (§3.4).
SRS	Software Requirements Specification
SSDD	System and Software Design Document
SSRS	System and Software Requirements Specification
System	"A collection of components organized to accomplish a specific function or set of functions" ISO/IEC 42010:2007 (§3.7).

Term or Acronym	Definition
System and Software Architecture and Design Description	An architectural and detailed design description that includes a software system within the context of its enclosing system and describes the enclosing system, the enclosed software, and their relationship and interfaces.
System Stakeholder	"An individual, team, or organization (or classes thereof) with interests in, or concerns, relative to, a system" ISO/IEC 42010:2007 (§3.8).

1.5 DOCUMENT REFERENCES

This subsection shall list full bibliographic citations of all documents referenced in this SSDD. This subsection shall also identify the source for all materials not available in printed form (e.g., web-based information) and list the complete URL along with owner, author, posting date, and date last visited.

1) CSDS, *System and Software Requirements Specification Template*, Version 1.0, July 31, 2008, Center for Secure and Dependable Systems, University of Idaho, Moscow, ID, 83844.

2) ISO/IEC/IEEE, *IEEE Std 1471-2000 Systems and software engineering – Recommended practice for architectural description of software intensive systems,* First edition 2007-07-15, International Organization for Standardization and International Electrotechnical Commission, (ISO/IEC), Case postale 56, CH-1211 Genève 20, Switzerland, and The Institute of Electrical and Electronics Engineers, Inc., (IEEE), 445 Hoes Lane, Piscataway, NJ 08854, USA.

3) IEEE, *IEEE Std 1016-1998 Recommended Practice for Software Design Descriptions*, 1998-09-23, The Institute of Electrical and Electronics Engineers, Inc., (IEEE) 445 Hoes Lane, Piscataway, NJ 08854, USA.

4) 3) ISO/IEC/IEEE, *IEEE Std. 15288-2008 Systems and Software Engineering – System life cycle processes,* Second edition 2008-02-01, International Organization for Standardization and International Electrotechnical Commission, (ISO/IEC), Case postale 56, CH-1211 Genève 20, Switzerland, and The Institute of Electrical and Electronics Engineers, Inc., (IEEE), 445 Hoes Lane, Piscataway, NJ 08854, USA.

5) ISO/IEC/IEEE, IEEE Std. 12207-2008, *Systems and software engineering – Software life cycle processes,* Second edition 2008-02-01, International Organization for Standardization and International Electrotechnical Commission, (ISO/IEC), Case postale 56, CH-1211 Genève 20, Switzerland, and The Institute of Electrical and Electronics Engineers, Inc., (IEEE), 445 Hoes Lane, Piscataway, NJ 08854, USA.

1.6 DOCUMENT OVERVIEW

This subsection shall provide an overview of the organization of this SSDD.

Section 2 of this document describes the system and software constraints imposed by the operational environment, system requirements and user characteristics, and then identifies the system stakeholders and lists describes their concerns and mitigations to those concerns.

Section 3 of this document describes the system and software architecture from several viewpoints, including, but not limited to, the developer's view and the user's view.

Section 4 provides detailed design descriptions for every component defined in the architectural view(s). Sections 5 provides traceability information connecting the original specifications (referenced above) to the architectural components and design entities identified in this document.

Section 6 and beyond are appendices including original information and communications used to create this document.

1.7 DOCUMENT RESTRICTIONS

This subsection shall describe security and privacy considerations associated with the information contained in this document as well as rules and restrictions for the use and distribution of this SSDD and the information contained within.

This document is for LIMITED RELEASE ONLY to UI CS personnel working on the project and [state others who will receive the document].

2 CONSTRAINTS and stakeholder concerns

This section of the document shall identify environmental or usability constraints placed upon the development and use of the system and software, the stakeholders of the system and software, and their concerns about the system and software, if any.

2.1 CONSTRAINTS

This subsection shall identify and describe in detail the architectural and usability constraints that are imposed by the physical environment or system requirements or the user characteristics.

2.1.1 Environmental constraints.

[Insert text here.]

2.1.2 System requirement constraints.

[Insert text here.]

2.1.3 User characteristic constraints.

[Insert text here.]

2.2 STAKEHOLDER CONCERNS

This subsection shall identify all the system and software stakeholders. Some categories have already been included, add more categories as needed. Within each category add the list of stakeholders and their details. For compliance with ISO/IEC 42010:2007 (§5.2) at a minimum the following concerns shall be identified and described for the system and software object of this SSDD: appropriateness of the architected solution for achieving its desired mission, feasibility of construction, risks of system construction and operation to all stakeholders, maintainability, deployability, and evolvability. Other stakeholder concerns for the system and software might be: construction cost, expected lifetime, cost of operation, cost of maintenance, system safety, data security and privacy, operator and user safety, etc. For each concern make a reference to the corresponding stakeholder(s) (a concern might come from more than one stakeholder).

The following tabular form is preferred, but not required. You may eliminate inappropriate rows and add categories and concerns as needed.

Stakeholder x Concern x Mitigation Table			
Stakeholder Concern	List of Stakeholders (e.g. Acquirers, Developers, Testers, Maintainers, Users, Operators, Auditors, Others)	Stated Concern	Mitigation Mechanism or Design Criteria Reference Number
Appropriateness of the system and software in fulfilling its mission(s).			
Feasibility of constructing, testing, verifying and deploying the system and software.			
Risks of constructing, deploying, and using the system and software object of this SSDD.			
Concerns with respect to the deployability of the system and software.			
Concerns with respect to the maintainability and evolvability of the system and software.			

Stakeholder x Concern x Mitigation Table			
Stakeholder Concern	List of Stakeholders (e.g. Acquirers, Developers, Testers, Maintainers, Users, Operators, Auditors, Others)	Stated Concern	Mitigation Mechanism or Design Criteria Reference Number
Appropriateness of the system and software in fulfilling its mission(s).			
Concerns with respect to the security of the data the system and software will handle.			
Concerns with respect to the safety of the people interacting with the system and software.			
Cost concerns.			
[list concern]			
[list concern]			

3 SYSTEM AND SOFTWARE ARCHITECTURE

This section of the document shall describe with detail every detailed design entity or component of the system as well as the relationship and interface between them. These architectural entities, when integrated together as specified within this document, shall implement all functions performed by the system in response to an input or in support of an output as described by the System and Software Requirements Specification (SSRS). All architectural entities or components shall: be uniquely identi[FB01?]able, be well described, have clear responsibilities, have well specified interfaces, and have well described interactions with other architectural entities and any external systems. A system's architecture is usually described by using a set of different views, typically one for the developer and others for the customer, users, operators, etc. All necessary views at the architectural level (or high-level design) shall be clearly described in this section. In this section we assume that the reader is familiar with such architectural description languages. For compliance with ISO/ISEC 42010:2007 (§5.4) each view shall include at least the following details: identification, system representation using the corresponding viewpoint, configuration information, languages and modeling techniques, and references to detailed or further descriptions of the viewpoint.

3.1 DEVELOPER'S ARCHITECTURAL VIEW

This subsection contains the descriptions of a system and all of its major components, using the methods, techniques, and languages from the developer's viewpoint. Each viewpoint description includes the viewpoint identification, description, and diagrammatic representation.

3.2 USER'S ARCHITECTURAL VIEW

This subsection contains the descriptions of a system and all of its major components, using the methods, techniques, and languages from the user's viewpoint. Each viewpoint description includes the viewpoint identification, description, and diagrammatic representation.

3.2.1 User's View Identification

Identify the view, state the purpose of the view, and identify major components or processes of the architecture.
    [Insert text here.]

3.2.2 User's View Representation and Description

Provide a diagram and description of the user's view of the architecture.
    [Insert diagram here.]

3.3 Developer's View Identification

Identify the view, state the purpose of the view, and identify major components or processes of the architecture.
    [Insert text here.]

3.3.1 Developer's View Representation and Description

Provide a diagram and description of the developer's view of the architecture.
    [Insert diagram here.]

3.3.2 Developer's Architectural Rationale

For compliance with ISO/IEC 42010:2007 (§5.6) an Architectural Description (AD) shall provide the rationale that justified the architect's decisions and selected architectures. An AD shall also provide evidence of the consideration of other alternative architectures and the rationales for discarding them.
[Insert rationale here.]

3.4 [insert name of viewpoint] ARCHITECTURAL VIEW

This subsection contains the descriptions of a system and all of its major components, using the methods, techniques, and languages from other than the developer's or user's viewpoint. Each viewpoint description includes the viewpoint identification, description, and diagrammatic representation.

Repeat this subsection for each viewpoint identified.

3.4.1 [insert name of viewpoint]'s View Identification

Identify the view, state the purpose of the view, and identify major components or processes of the architecture.
[Insert text here.]

3.4.2 [insert name of viewpoint]'s View Representation and Description

Provide a diagram of the developer's view of the architecture.
[Insert diagram and descriptions here.]

3.5 CONSISTENCY OF ARCHITECTURAL VIEWS

For compliance with ISO/IEC 42010:2007 (§5.5) an Architectural Description (AD) shall include a list of all known inconsistencies between the architectural views and an analysis of consistency across all the architectural views.

3.5.1 Detail of Inconsistencies between Architectural Views

[Insert text and graphics here.]

3.5.2 Consistency Analysis and Inconsistency Mitigations

For each inconsistency identified above, provide solutions or mitigations that resolve potential conflicts between the stakeholder viewpoints.
[Insert text or table here.]

4 SOFTWARE DETAILED DESIGN

This section of the document should describe with detail the design of the software being described in this document. The level of detail of the design entities and their relationship and interfaces shall be sufficient to enable software implementers to implement an integrate each of the described components in order to achieve full implementation of the software being described in this SSDD. This section shall specify for each design entity the following information: purpose, processing, data, interfaces, dependencies and relationships, concept of execution, needed resources, design rationale, information for reuse, types of errors, and error handling.

The detailed design must correspond to an existing architectural view, normally the developer's view, but unusual circumstances may call for other detailed design viewpoints. If so, repeat this subsection as needed for those other viewpoints.

4.1 DEVELOPER'S VIEWPOINT DETAILED SOFTWARE DESIGN

Identify the viewpoint and make reference to the diagram or model defining the view.
[Insert text, diagram or model here.]

4.2 COMPONENT/ENTITY DICTIONARY

This subsection shall list and describe all the detailed design entities and their corresponding attributes. Processing and algorithms, data and data structures,and detailed descriptions need NOT be included here, as they will be specified in subsequent sections for each component or entity listed in the table below.

Component/Entity Dictionary				
Name	**Type/Range**	**Purpose/Function**	**Dependencies**	**Subordinates**

4.3 COMPONENT/ENTITY DETAILED DESIGN

4.3.1 Detailed Design for Component/Entity: [insert Component/Entity name here]

4.3.1.1 Introduction/Purpose of this Component/Entity [insert your text here]

4.3.1.2 Input for this Component/Entity [insert your text here]

4.3.1.3 Output for this Component/Entity [insert your text here]

4.3.1.4 Component/Entity Process to Convert Input to Output [insert your text here]

4.3.1.5 Design constraints and performance requirements of this Component/Entity [insert your text here]

4.3.2 Detailed Design for Component/Entity: [insert Component/Entity name here]

4.3.2.1 Introduction/Purpose of this Component/Entity [insert your text here]

4.3.2.2 Input for this Component/Entity [insert your text here]

4.3.2.3 Output for this Component/Entity [insert your text here]

4.3.2.4 Component/Entity Process to Convert Input to Output [insert your text here]

4.3.2.5 Design constraints and performance requirements of this Component/Entity [insert your text here]

4.3.3 Detailed Design for Component/Entity: [insert Component/Entity name here]

4.3.3.1 Introduction/Purpose of this Component/Entity [insert your text here]

4.3.3.2 Input for this Component/Entity [insert your text here]

4.3.3.3 Output for this Component/Entity [insert your text here]

4.3.3.4 Component/Entity Process to Convert Input to Output [insert your text here]

4.3.3.5 Design constraints and performance requirements of this Component/Entity [insert your text here]

4.3.3.5.1 . . .

4.3.4 Detailed Design for Component/Entity: [insert Component/Entity name here]

4.3.4.1 Introduction/Purpose of this Component/Entity [insert your text here]

4.3.4.2 Input for this Component/Entity [insert your text here]

4.3.4.3 Output for this Component/Entity [insert your text here]

4.3.4.4 Component/Entity Process to Convert Input to Output [insert your text here]

4.3.4.5 Design constraints and performance requirements of this Component/Entity [insert your text here]

4.4 DATA DICTIONARY

This subsection shall list and describe all the data and data structures defined and/or used by the components and entities specified above. For each data item or structure indicate where it is defined, referenced, and modified.

Data Dictionary				
Name	**Type/Range**	**Defined by. . .**	**Referenced by. . .**	**Modified by. . .**

5   REQUIREMENTS TRACEABILITY

This section shall contain traceability information from each system requirement in this specification to the system (or subsystem, if applicable) requirements it addresses. A tabular form is preferred, but not mandatory. A detailed mapping between requirements and constraints in the SSRS and architectural components and detailed entities in this SSDD is required. For compliance with ISO/IEC 15288:2008 (§6.4.3.3.c) an Architectural Description (AD) shall provide roundtrip traceability between the system and software requirements and the architectural design entities. All requirements and constraints within the SSRS shall map to a set of architectural entities. All entities in all the architectural views shall be associated with either a requirement or constraint in the SSRS or an architectural constraint within this SSDD.

Feature Name	Req No.	Requirement Description	Priority	SDD	Alpha Release		Beta Release	
					Test Case(s)	Test Res.	Test Case(s)	Test Res.
	1.1							
	1.2							
	...							
	1.[n]							
	2.1							
	2.2							
	...							
	2.[n]							
	3.1							
	3.2							
	...							
	3.[n]							
...	...							
	[m].1							
	[m].2							
	...							
	[m.n]							

Priorities are: **M**andatory, **L**ow, **H**igh

   SDD link is version and page number or function name.

   Test cases and results are file names and **P**ass/**F**ail or % passing.

6 APPENDIX A. [insert name here]

Include copies of specifications, mockups, prototypes, etc. supplied or derived from the customer. Appendices are labeled A, B, . . . n. Reference each appendix as appropriate in the text of the document.

[insert appendix A here]

7 APPENDIX B. [insert name here]

[insert appendix B here]