

CS 428

Creating an Architecture and design Document

WINTER 2020

BRUCE F. WEBSTER

- ▶ Fundamental organization of the system to be constructed
 - ▶ Focus on connections and interfaces among subsystems
- ▶ Grounded in the end-user's needs and requirements
 - ▶ Prioritization/selection of guiding principles and concepts in building that system
- ▶ Fundamental structure/environment of the solution
 - ▶ Choice of 'materials', 'location', and so forth
 - ▶ Resulting constraints and opportunities due to those choices
- ▶ Requires negotiation/buy-in among team members, management, end-users
 - ▶ Remember: "[Architecture is a political act.](#)" – Tom Affinito

What is architecture?

- ▶ “To be architectural is to be
 - ▶ the most abstract depiction of the system
 - ▶ that enables reasoning about critical requirements
 - ▶ and constrains all subsequent refinements.” (Clements et al., p. 23)
- ▶ The architecture of a software system:
 - ▶ Defines that system in terms of computational components and interactions among those components...
 - ▶ Shows the correspondence between the system requirements and elements of the constructed system...
 - ▶ Clarifies structural and semantic differences among components and interactions. (Shaw & Garlan, p. 3)

Some definitions of software architecture

- ▶ Top-level design – functional, physical, and operational, the partitioning of which can be very important (the ‘what’)
- ▶ Creative, obsessive juggling of requirements, constraints, technology, costs, and standards (the ‘how’)
- ▶ Creating an enduring base for growth and change (the ‘why’)
 - ▶ – cited in Rechtin (1991, p. 22)

An approach to software architecture (Spinrad)

- ▶ Conditions of customer delight – that is, your customer will love your solution because the architecture meets or embodies these aspects
- ▶ The 'what': draw your top-level design, **showing major subsystems and the interactions among them**
- ▶ The 'how': document your explicit choices and trade-offs in technology, approach, feature set
- ▶ The 'why': explain how the 'what' and the 'how' work towards product success; in other words, how your design (what) and choices (how) will delight the customer

What your architecture should include

- ▶ **Reliability:** sufficiently free from errors/downtime
- ▶ **Performance:** completes tasks in acceptable time
- ▶ **Functionality:** implements all critical/desirable features
- ▶ **Competitiveness:** fills need and is superior to other systems
- ▶ **Compatibility:** interacts effectively with existing IT systems/programs
- ▶ **Lifespan:** operates sufficiently long to achieve benefits
- ▶ **Deployment:** ships and installs in an acceptable timeframe
- ▶ **Support:** allows upgrading, expanding, and repairing over time
- ▶ **Cost:** can be developed, deployed, and supported within the budgeted time and cost

Quality goals affecting architecture

- ▶ Specific solutions to implementing architecture
 - ▶ Can be mandated and/or prohibited (“Thou shalt”, “Thou shalt not”)
 - ▶ Opportunity for design reuse (design patterns)
- ▶ Goal of ensuring conceptual unity in actual implementation
- ▶ Covers a wide variety of areas
 - ▶ UX/UI
 - ▶ Database design / data structure design
 - ▶ Patterns in module interfaces (including ‘deep interfaces’)
 - ▶ Coding standards and guidelines
 - ▶ Use of specific tools, solutions, languages, libraries
- ▶ Deliverables often depend upon methodology being used

What is design?

- ▶ Front matter: purpose of product & purpose of document
- ▶ Overall view of system architecture (major subsystems, connections)
- ▶ Divisions based on approach/team
 - ▶ Front end vs back end
 - ▶ Data/database design specifics
 - ▶ Game design principles
- ▶ Fill in details to allow implementation from the design
- ▶ Identify the hard problems up front and prioritize them

Suggested approach to architecture & design document

- ▶ Should be on your team's wiki in GitHub by Saturday at midnight
- ▶ TUESDAY afternoon (02/18), in class, each team's chief architect will have to explain the rationale for that team's approach to architecture and design
- ▶ Don't forget status report, podcast also due by Saturday night
- ▶ Readings for next week: MMM:5,11; PW:4,6; ACC:3; WEB:#5

Assignment for this week: create & upload
initial arch / design documents