



CpSc 875

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Class 4 – Driving requirements

Driving requirements

- There are always too many requirements for the team to consider.
- The driving requirements are those things that are most important to the most important stakeholders.
- We will look at a specific technique: the Quality Attribute Workshop.

NOAA architecture document

- This paper presents a software architecture for the Integrated Hydrologic Forecast System (IHFS). The IHFS goal is to support the Hydrologic Research Laboratory mission and vision by the providing a more effective system of tools and techniques for use at River Forecast Centers (RFCs), Weather Forecast Offices (WFOs), and supporting Headquarters Offices to allow the easy introduction of new science that costs less to enhance and maintain.
- http://www.nws.noaa.gov/oh/hrl/ihfs/architecture_doc/ihfscnts.php
- The next couple of slides give an overview

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Architecture

- At the top level the dominant structure is layers
- **Driving Requirements**
 - 1. Provide for easy and cost-effective enhancement and maintenance of systems used for river forecasting.
 - 2. Support efficient operations and information sharing between the RFCs and WFOs.
 - 3. Support the current functions of NWSRFS, WHFS, and other functions supporting hydrologic analysis and forecasting.
 - 4. Preserve the current NWSRFS science.
 - 5. Simplify the addition of new science and techniques.

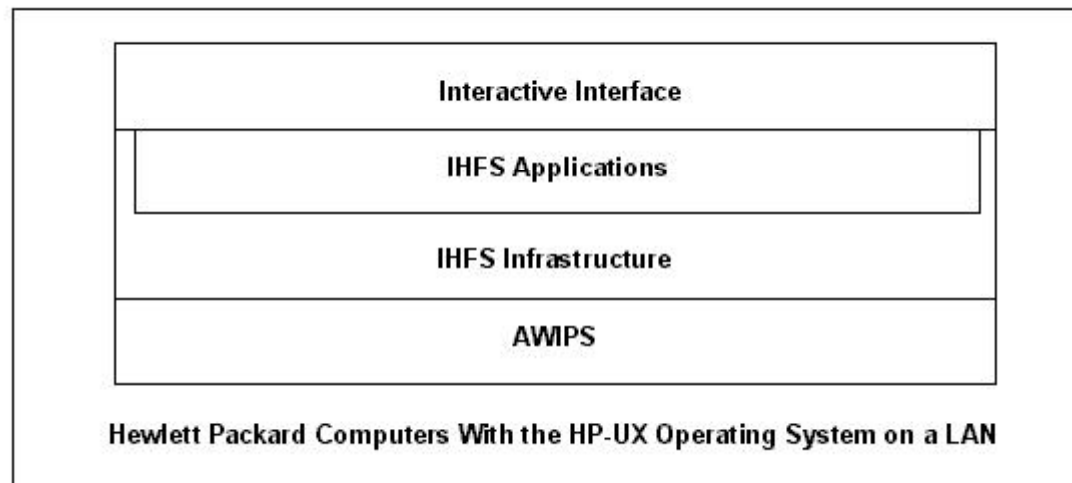


Figure 1. IHFS Architecture Layers

QAW - 1

QAW Steps Description

- **Step 1 – QAW Presentation and Introductions**
- QAW facilitators describe the motivation for the QAW and explain
- each step of the method. Next, the facilitators introduce themselves
- and the stakeholders do likewise, briefly stating their background,
- their role in the organization, and their relationship to the system
- being built.
- **Step 2 – Business/Programmatic Presentation**
- A stakeholder representing the business and/or programmatic
- concerns presents the system's business/programmatic context, highlevel
- functional requirements, constraints, and quality attribute
- requirements.

QAW - 2

- **Step 3 – Architectural Plan Presentation**

- A technical stakeholder presents the system architectural plans
- including (1) plans and strategies for how key
- business/programmatic requirements will be satisfied; (2) key
- technical requirements, risks, and constraints—such as mandated
- operating systems, hardware, middleware, and standards—that will
- drive architectural decisions; (3) existing context diagrams, high-level
- system diagrams, and other written descriptions; (4)
- operational and system architectures, and architectural frameworks,
- tools, and architectural life-cycle processes being used; and (5) the
- prototyping and engineering studies underway to mitigate known
- risks.

QAW - 3

- **Step 4 – Identification of Architectural Drivers**
- The facilitators share their list of key architectural drivers that
- include high-level requirements, business drivers, constraints, and
- quality attributes.
- **Step 5 – Scenario Brainstorming**
- The facilitators ask the stakeholders to brainstorm scenarios that are
- operationally meaningful with respect to the stakeholders' individual
- roles.
- **Step 6 – Scenario Consolidation**
- Similar scenarios are consolidated when reasonable.

QAW - 4

- **Step 7 – Scenario Prioritization**
- Stakeholders vote to establish the priorities of the scenarios.
- **Step 8 – Scenario Refinement**
- The high-priority scenarios are refined in more detail.
- Facilitators further elaborate each one, documenting the following: the six parts of the scenario, the business/programmatic goals that are affected by this scenario, the relevant quality attributes associated with this scenario, and the questions and issues regarding the scenario.

Scenario

- Format for a scenario

Scenario Refinement for Scenario N		
Scenario(s):		
Business Goals:		
Relevant Quality Attributes:		
Scenario Components	Stimulus:	
	Stimulus Source:	
	Environment:	
	Artifact (If Known):	
	Response:	
	Response Measure:	
Questions:		
Issues:		

Output from QAW

- a list of architectural drivers
- the raw scenarios
- the prioritized list of raw scenarios
- the refined scenarios

QAW Roles

- QAW lead: The lead ensures that the steps of the method are carried out during the workshop. The lead facilitates discussions, and ensures that the method is carried out in a timely fashion and that the required QAW artifacts are produced.
- QAW scribe: The scribe captures the raw scenarios, their prioritization, the refined scenarios, and any relevant issues that emerge during the workshop. The scribe uses the standard
- QAW template shown below as a guide during the workshop to ensure that the appropriate information is captured in a consistent manner.

The executive

- The executive is trying to achieve business goals
- The architecture (and the product) are tools
- The executive wants customers satisfied and few repairs

The architect

- The architect wants to keep everyone happy (and quiet).
- Wants trade-offs to be explicit and widely communicated
- Reduces complexity everywhere including desk and home
- Wants input but also wants authority

The developer

- The developer wants to make progress quickly, to stay interested
- Wants to turn out a quality product that will not need lots of testing and debugging
- Wants clear direction so that it can be once and done
- Wants to focus on new, interesting design problems, not yet another ...

The customer

- Our customer is the surgical robot manufacturer.
- They want several models with different features and different price points
- After the features, the most important attribute is correctness
- They have to install the equipment, repair when necessary, and occasionally add a custom piece.

Next steps

- Read about the Quality Attribute Workshop

<http://www.sei.cmu.edu/reports/04tn017.pdf>

<http://www.sei.cmu.edu/reports/03tr016.pdf>