Abstract

Many decisions are taken during the architecting of a system. The question is what are architectural decisions? And what is the process behind making these decisions? The expectations of the stakeholders will be discussed. The actual way of working of architects will be described.
Architectural Decision Making; What Happens Behind the Scenes?

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Buzzword, Hype, Solution or What?

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What is Architecture?

Mark all applicable boxes:

- specifications
- components (implementations)
- infrastructure
- API's
- indicators
- high level rules
- concepts
- standards
- overarching vision
- guidance monitoring
- domain codification
- other...

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HMPAwhatIsArchitecture
Architecture vs Description

Architecture
Subset of which architect is aware

Flattened into
Architecture description
Actually written by architect(s)
My View on Architecture

Understanding Why
Describing What
Guiding How

Do the right things
Do the things right
"Guiding How" by providing rules for:

1. Functional Decomposition
2. Construction Decomposition
3. Allocation
4. Infrastructure
5. Choice of integrating concepts

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LWAArchitectureHow
The Art of Architecting

Stakeholders

Expectations

Architecting

Facts

Architecture(s)

problems, legacy

Architect(s)

Intuition, assumptions, beliefs, bias

Facts, Expectations and Intuition may be false
Integration requires a critical mindset that is alert for unknowns

analyze
assess
balance
trade-off
decide

vision
overview
insight
understanding

Architecture uncertainties unknowns
Another Buzzword or Solution?

architecture → decision → architect → system

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How many (architectural) decisions does an architect make?
Decision Making Process

1. Problem understanding
2. Analysis
3. Decision
4. Monitor, verify, validate

- insufficient data
- no satisfying solution
- invalidated solution
- conflicting other decision
- vague problem statement

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1. Problem understanding by exploration and simple models

2. Analysis by
   + exploring multiple propositions (specification + design proposals)
   + exploring decision criteria (by evaluation of proposition feedback)
   + assessment of propositions against criteria

3. Decision by
   + review and agree on analysis
   + communicate and document

4. Monitor, verify, validate by
   + measurements and testing
   + assessment of other decisions
Graph of Decisions and Alternatives

Legend:
- past decision
- most probable decision
- potential alternative
- less probable alternative

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Different Types of Decisions

Understanding
Why
basic principles

Describing
What
requirements

Guiding
How
architecture rules
implementation choices
f.i. technology
Many Decisions are taken in the Dark

Highest impact decisions are taken while the least factual knowledge is available
Chicken or Egg?

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Why Project Leaders Sometimes don’t like Architects

Facts, Expectations and Intuition might be false

Highest impact decisions are taken while the least factual knowledge is available

decision - action chicken or egg?
Bottom-line is a Working System
Decisions Are Related

Customer objectives

Application

Functional

Conceptual

Realization

why?

what?

how?

why?

what?

how?

why?

what?

how?

why?

what?

how?
Worse, Decisions Are **Heavily** Related

Customer objectives | Application | Functional | Conceptual | Realization

[Diagram showing relationships between different stages of architectural decision making]

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TORnetworkedIssues
Architecting is much more than Decomposition

Decomposition is "easy"

Integration is difficult
In Documentation Terms

δ's or structured

- minutes 1
  - decision 1
  - decision 2
  - decision 3

- minutes 2
  - decision 4
  - decision 5
  - decision 6

- minutes k
  - decision n
  - decision n+1
  - decision n+2

Diagram: System divided into subsystems with qualities such as performance.
Revisiting Architecture

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Fundamental Question

Is architecture = \sum_{all} \text{decision} = \text{preconceived} = \text{emerging from} \text{environment} \text{system} \text{creation context}?

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ADMarchitectureRevisited
The End

Back-up Slides and Answers only after this Slide
Quantification from “The Role and Task of the System Architect”

<table>
<thead>
<tr>
<th>Category</th>
<th>Quantity per year (order-of-magnitude)</th>
<th>architect time per item</th>
</tr>
</thead>
<tbody>
<tr>
<td>consolidation in deliverables</td>
<td>10</td>
<td>100 h</td>
</tr>
<tr>
<td>meetings</td>
<td>$10^2$</td>
<td>1 h</td>
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<tr>
<td>informal contacts</td>
<td>$10^4$</td>
<td>0.5 – 10 min</td>
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<tr>
<td>sampling scanning</td>
<td>$10^5 - 10^6$</td>
<td>0.1 – 1 sec</td>
</tr>
<tr>
<td>product details</td>
<td>$10^7 - 10^{10}$</td>
<td></td>
</tr>
<tr>
<td>real-world facts</td>
<td>infinite</td>
<td></td>
</tr>
</tbody>
</table>
Quantification from “Architectural Thinking”

- Number of details
- Stretch
- Mono-disciplinary stretch
- Subsystem or function stretch
- System stretch

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AT:mental:Dynamic:Range