



ADAPTATION

ADAPTATION (1)

- Adaptive systems: adapt their runtime behaviour to current resource availability
 - Accommodate heterogeneity by allowing software reuse across contexts
 - Accommodate changing runtime resource conditions by adapting application behaviour without sacrificing crucial application properties
- Context-aware adaptation of content
 - Abstract content specification with concrete representation that fits needs – often impractical due to heterogeneity
 - Content delivery relies on context
 - Handcrafting solutions for different contexts is too costly
 - Programmatic adaptation of content (selection, generation and or transformation) – XML and XSLT, transcoding
 - Adaptation within or across media types



ADAPTATION (2)

- Content adaptation in a web context?
 - Ubiquitous computing requires standards for expressing device capabilities and configurations
 - Composite Capabilities Preferences Profile (CC/PP), OMA user agent profiles for mobile phones
 - Communicate URI of device profile
 - Type-specific compression for limited bandwidth
 - Lossy compression specific to media type
 - On the fly transcoding
 - Transcoding performed in proxy servers
- Volatile systems
 - Require adaptation between any pair of dynamically associated devices
 - Potentially many more providers, potentially too resource-poor
 - Proxy in smart spaces, a closer look to content adaptation on small devices
 - Compression for communication, but memory access patterns?



ADAPTATION (3)

- Adapting to changing system resources
 - OS support for adaptation to volatile resources
 - Adaptation approaches
 - Application request and obtain resource reservations, but difficult to achieve QoS guarantees
 - Notify the user of changed levels of resource availability
 - The OS to notify the applications of changing resource conditions
 - Odyssey provides OS support for application adaptation
 - Fidelity: type-specific quality, Viceroy, Window of tolerance
 - Taking advantage of smart space resources
 - Cyber foraging: offloading of processing load to computation rich devices
 - Energy-aware adaptation
 - Requires application decomposition, minimising communication with compute servers
 - Application partitioning and resource monitoring
 - Static division of applications into separate communicating programs



ADAPTATION (4)

- Making adaptive software is difficult and there is no general agreement on how to do it
 - Models of variation can be hard to derive
 - Software engineering challenges
 - Finding suitable points of adaptation in existing software
 - Aspect-oriented programming
 - Reflective middleware
 - Model-based development & adaptation

