Detecting Feature Interactions in Web Services

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Web Services

- Web services are a way of packaging and publishing functionality to the network for use by other applications
- Web services can aggregate other web services from a web of services to provide a higher-level set of features
Web Services

• Paradigm for constructing distributed applications
  – Lack of centralized control (# businesses)
  – Diversity of technology platforms
  – Rapid evolution of business environment

• Much work to date on low level concerns
  – Publishing, discovering, and invoking of services

• Service integration raise significant challenges
  – Little research on managing interactions

Composition of Web Services

• Explicit composition
  – Flow

• Implicit composition
  – Parallelism
  – Side effect

uses
side effect
Feature Interaction Problem

- Coordination of features so that their composition achieves the desired result at application level
  - We use "feature" and "service" interchangably here
- Root causes (from telephony)
  - Conflicting goals
  - Competition for resources
  - Changing assumptions
  - Design evolution
  - … ? (web services)

Functional and Non-Functional

- Most interactions studied of functional nature
  - eg between CW and CFB (telephony)
- However, each functional composition impacts the satisfaction of non-functional requirements
  - Mostly neglected by current research!
- Feature interactions in web services not really studied (some work on SoC, AOP, …)
Example: Personalized Services

- m-Commerce
  - Personalization through information filtering
  - Based on user identity and profile
- Many design issues
  - Dynamic composition
  - Trust
  - Privacy concerns
  - …

[Diagram showing functional composition and NFR framework]
Analysis

• Current identity services such as Passport blur the line between authentication and authorization
  – Identifying the user (authentication)
  – Giving site access to user profile (authorization)

• Once user authenticates to Passport-enabled site all information is shared with the site

• Potential solution is to restrict identity service to authentication, and control access to profile within user agent (eg following the P3P proposal)

Conclusion

• Feature interaction in web services
  – Functional and non-functional

• Our research on non-functional interactions
  – Use of NFR framework

• Goal is to develop a FI benchmark for WS
  – Set of interactions between web services

• Patterns for service composition
  – Represent NFRs as patterns