TRUSTED SERVICE REPRESENTATION AND SELECTION FOR GENERATING DISTRIBUTED REAL-TIME AND EMBEDDED (DRE) SYSTEMS
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1. Motivation

The description of available services are often ambiguous and easy to misinterpret.

The trusted selection process can be both costly and time-consuming.

2. Objectives

- Develop principles & framework that enables representation and selection of component and services based on trust
- Validate principles & framework on a representative case study from the domain of distributed real-time & embedded (DRE) systems

3. Challenges

- Trust is considered as an afterthought in service representation and selection.
- Do not capture the dynamic nature of trust in components and services.

4. Limitations of Current Work

- Current state-of-the-art methods use multi-level contracts that consist of four levels to facilitate service and component selection.
- Our research extends multi-level specification by incorporating trust contract using subjective logic—a type of probabilistic logic that explicitly takes uncertainty and belief ownership into account.
- Trust values for subjective logic are inferred and updated based on the following attributes:
  - Internal attributes (e.g., standards, code coverage, & etc.)
  - External attributes (e.g., user comment, ratings, & etc.)

5. TrDRES Trust Model [2]

- Trust of the software is evaluated using its conformance to its specification in terms of subjective trust.

\[ T_v = \langle (B;D;U) \rangle \]

- Internal View: Internal developers’ subjective experience of service contract details.
- External View: External users’ subjective experience about the service contract details.
- Overall trust of a service is defined as functional aggregation of internal and external views of aggregated subjective trust.

\[ T = f( T_{iv}, T_{xv}) \]

6. Trusted Service Representation

- Initial service selection experiments are performed on the Android MarketPlace—the mobile application market for Android phones
- https://play.google.com
- Internal attributes & external attributes are extracted from mobile application web page on Android MarketPlace & the actual application
- Represent data using extended multi-level specifications that incorporate trust & subjective logic

7. Trusted Service Selection Validation

- Demonstrate & validate different mobile application selection scenarios given user requirements for what applications must be installed on a phone using trust-enabled multi-level specifications & subjective logic [4]

- Examples
  - Select a set of applications that maximize the phone’s memory usage.
  - Select a set of applications that take up a specific amount of memory.
  - Select a set of applications that have the least errors.
  - Select a set of applications that meet their performance guarantees.

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