Flexible Data Collection with Smart Phones

02265 Advanced Topics in Software Engineering

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DTU Compute

Problem domain

- Survey in scientific studies
- Collecting data from people using predefined form electronically

Problem description

Current survey data collection is:

- Ad-hoc
- Not correlated
- Error prone
- Non-repeating surveys
- Missing out on technology benefits

Diverse implementations

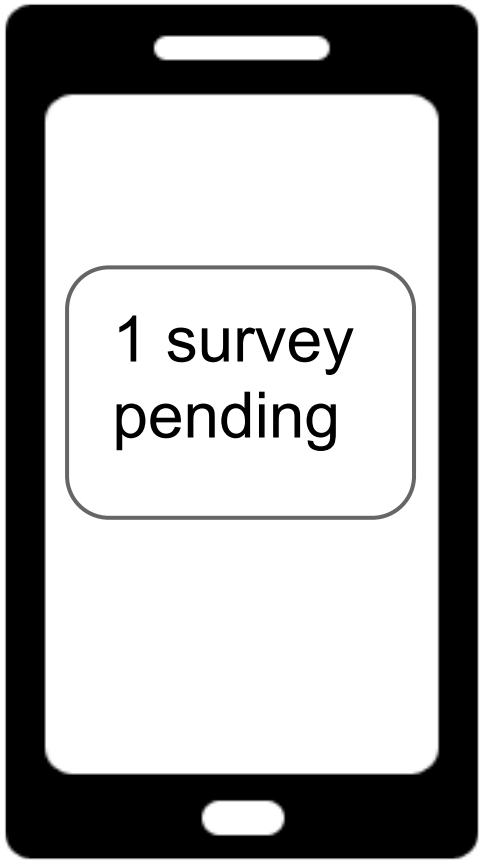
Application concept

Project overview

- Centralized survey collection
- Add additional semantics to surveys
  - Using a DSL for survey creation
  - Use the semantics for survey linking
- Utilising smartphone technology for propagating surveys to respondents

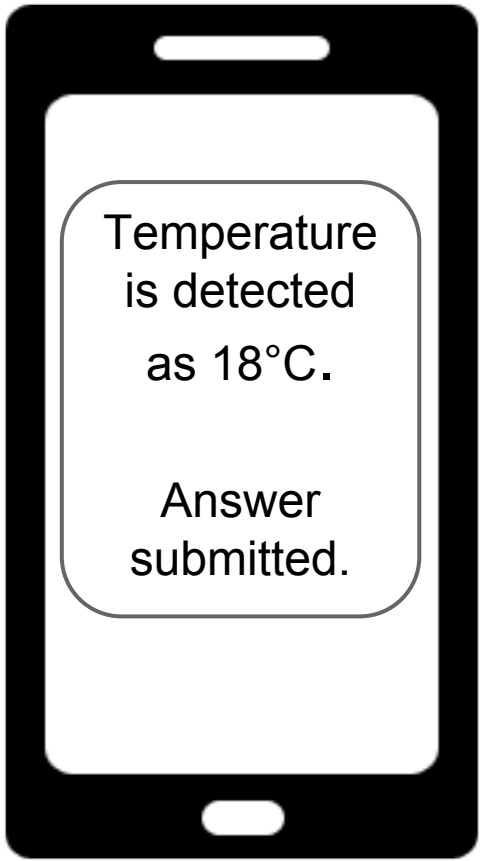
Be notified of surveys

- Using push notifications



Use smartphone sensors

- Answer selected questions automatically



Design goals

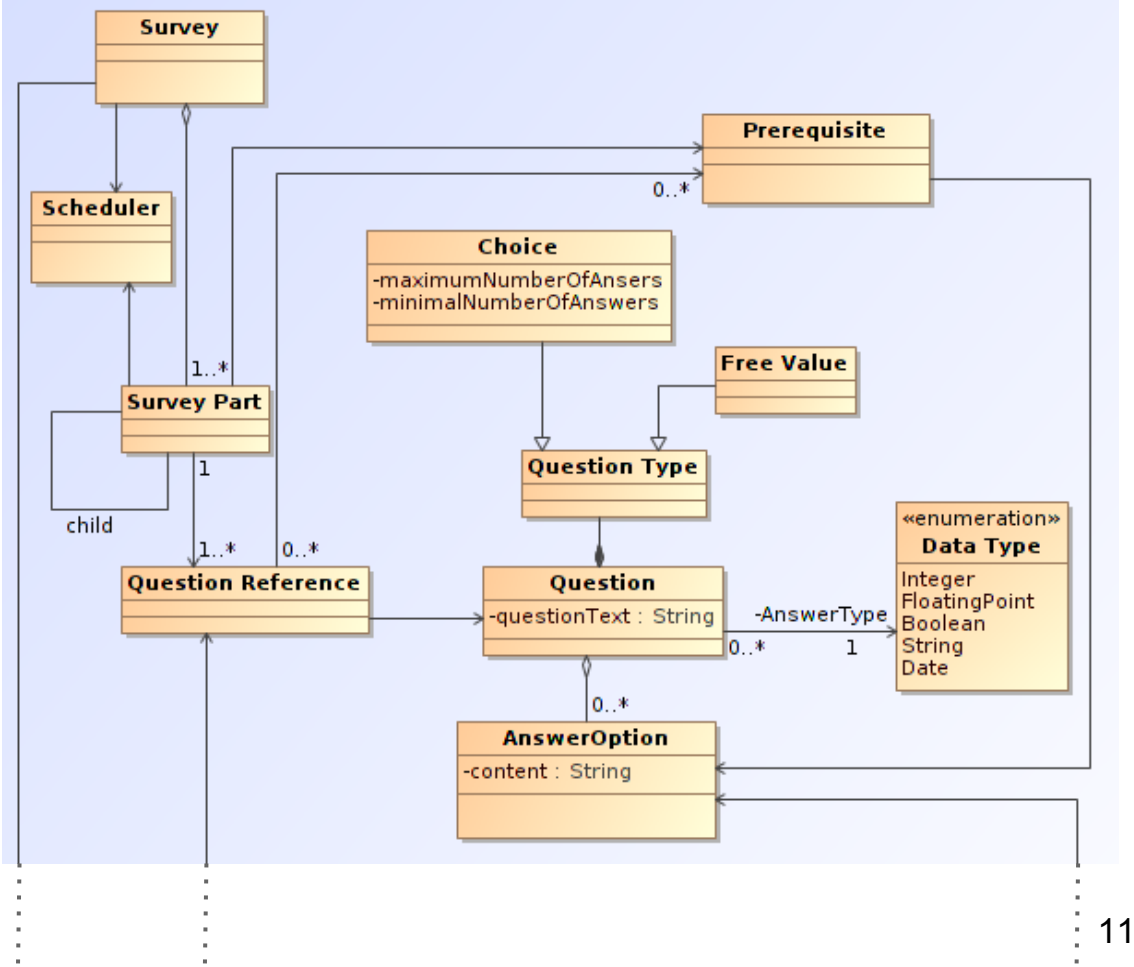
- Define surveys in a near-natural language
- Reuse surveys as templates
- Schedule parts of surveys independently
- To summarise: Make surveys more powerful, convenient and accessible

Application design

- Question/Answer stack
- Rendering survey questions in app
- DSL and graphical survey editor
- Cross platform smartphone app

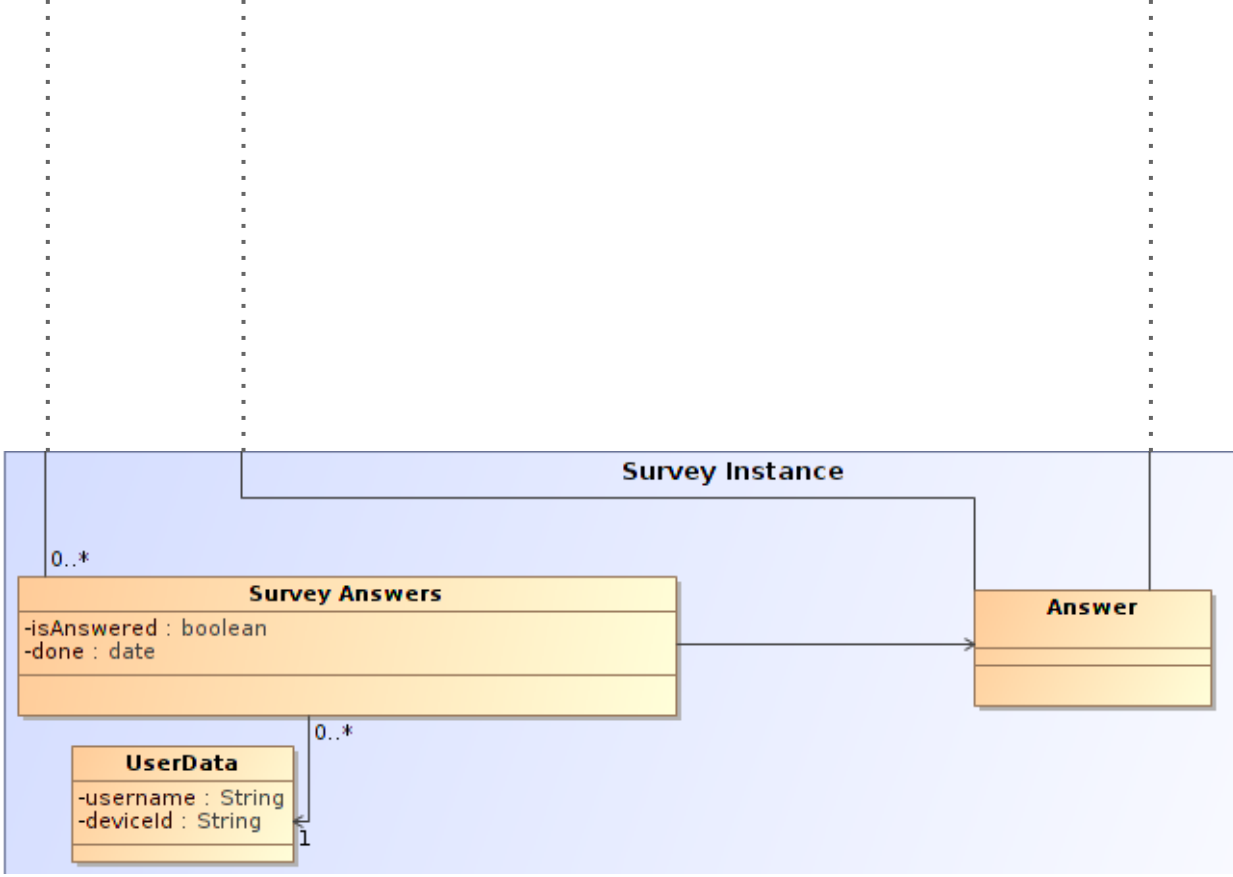
Metamodel

Survey scheme



Metamodel

Survey instance



DSL example

SURVEY Patient examination:

PART Personal information:
REPEAT: Once
QUESTION 1: What is your gender?
MANDATORY: Yes
TYPE: Single
ANSWERS: Male / Female / Other

QUESTION 2: What year were you born in?
MANDATORY: Yes
TYPE: Free

QUESTION 3: What country do you come from?
MANDATORY: Yes
TYPE: Free

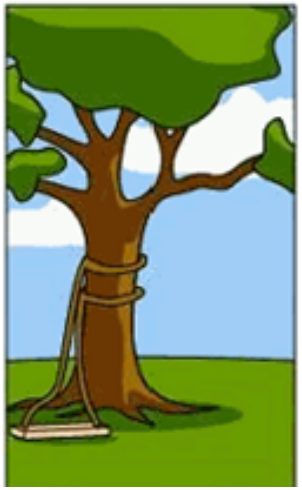
PART Comfort:
REPEAT: Daily
QUESTION 1: How are you feeling today?
MANDATORY: Yes
TYPE: Single
ANSWERS: 1..10

QUESTION 2: What is the reason of your discomfort?
MANDATORY: Yes
PREREQUISITES: Q1 -> <5
TYPE: Free

QUESTION 3: How would you describe your heat comfort?
MANDATORY: No
TYPE: Single
ANSWERS: Freezing / Cold / Acceptable / Warm / Hot

QUESTION 4: What is the ambient temperature?
MANDATORY: No
TYPE: Free / Temperature sensor

Implementation details



- ~~XML parser written from scratch~~
- Object serialization library
- eBNF grammar for DSL
- High level, intermediate and app data representations:

  DSL -> AST -> JSON/XML -> OBJECTS
- Xamarin for cross platform app implementation

App demonstration

- Current, first prototype state
- Graphical user interface considerations
- Rendering surveys and questions

Summary

- Designed a DSL for powerful and convenient survey definition
- Implemented first cross platform app prototype
- Laid foundation for future work and improvement of the system