CS 525M Mobile & Ubiquitous Computing

Mobile Health Mashups:

Making Sense of multiple streams of wellbeing and contextual data for presentation on a mobile device

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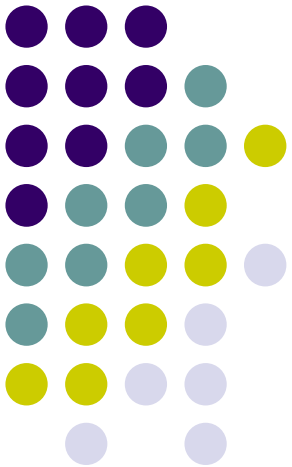
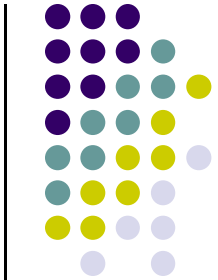
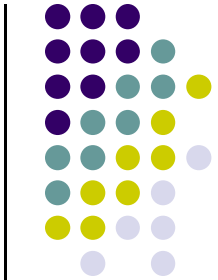


Application Objective



- Improve one's health
  - *Use mobile device to collect health activity*
  - *Aggregate data*
  - *Data correlation to identify behavioral anomalies*
    - *Ex: If I sleep more, I tend to be more active the following day*
- Ease of data interpretation
  - *Simple representation of information*
  - *User don't have to wade through multiple graphs*
  - *UI displays easy to understand interpretations*
    - *Ex: "You walk 80% more on weekends than weekdays"*

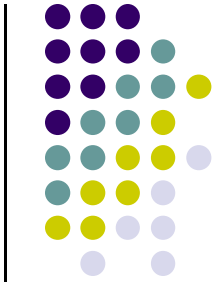
Functional Overview



- What is a Mashup?
  - *Describes a Web application that combines multiple services into a single application.**
- Data sources
  - *External devices (Wi-Fi enabled scale, Fitbit)*
  - *On-board mobile device sensors and applications*
  - *Manual data entry (meal diary)*
- Cloud computational & data storage services
  - *Statistical computations*
  - *Amazon S3 mid-size cloud resource*

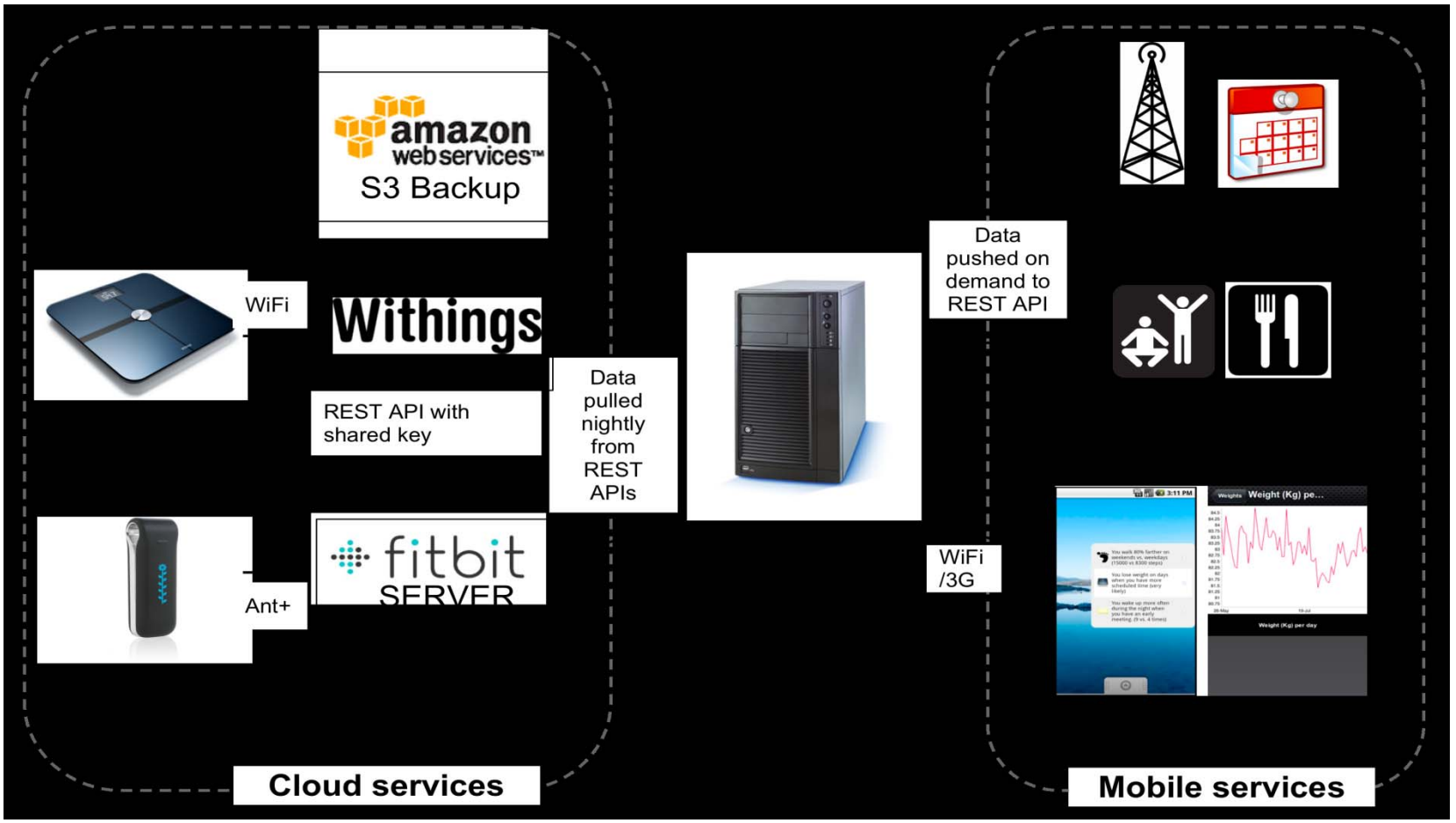
*http://www.techterms.com/definition/mashup

Functional Overview cont.

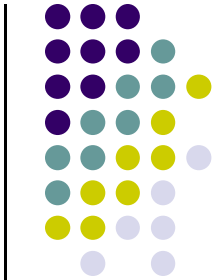


- Mobile device domain
  - *Calendar app*
  - *Meal diary app*
  - *Main application widget*
  - *REST API to push data to cloud*
- Cloud domain
  - *Withings server*
  - *Fitbit server*
  - *REST API to pull data from Withings, Fitbit and mobile device*

Functional Overview cont.

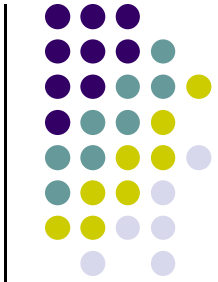


Architectural Overview



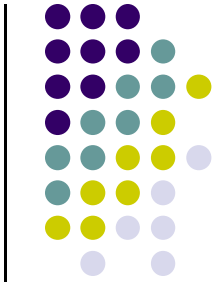
- Data acquisition
  - *Withings & Fitbit provide public API*
    - *Employs OAuth to allow to share with other services*
  - *Native calendar app entries*
  - *Meal diary entries*
  - *Location information*
  - *Acquired data pushed to server nightly for processing*
- Security
  - *Raw data not stored on server*
  - *Personal information cannot be reconstructed*

Architectural Overview cont.



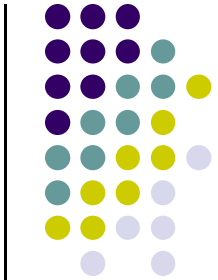
- Information processing
  - *Multiple time scale analysis*
  - *Data feeds analyzed:*
    - *Weight, body fat, steps, sleep, awoken, food, exercise….*
  - *Deviations calculated and thresholds applied*
  - *Data that satisfied threshold criteria is sent to mobile device*
  - *Templates define levels of probability*

Usability Issues



- Difficult to setup – e.g. Withings scale authentication
- Users did not use sensor devices frequently
  - *Sparse data lead to unpredictable results*
- Service restart problems
- Manual data entries not complete or non-existent

Recommendations



- Single sign-on service
- Keep app in constant use
  - *Games*
  - *Contests*
  - *Tie into social media*
  - *Keep content fresh*
- Save app state when power hits low H2O mark
- Use accelerometers and proximity sensors to track app usage