SECE: Sense Everything, Control Everything

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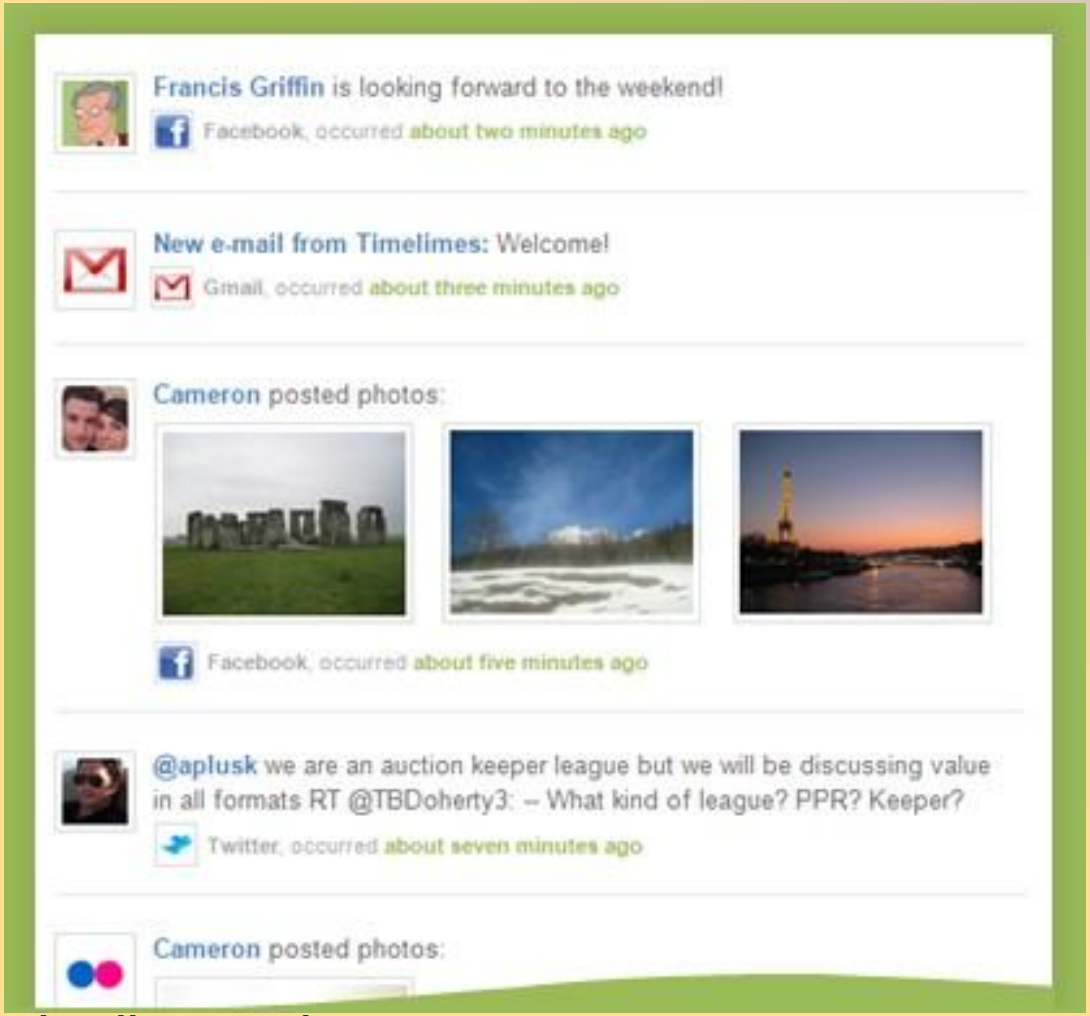
Overview

- SECE allows **non-technical users** to create **services** that combine
  - communication
  - calendaring
  - location
  - devices in the physical world
- SECE: *event-driven* system
  - uses high-level *event languages*
  - to trigger action scripts, written in Tcl

Not Just an Aggregation Service



Timelimes Web Aggregator

Related Work

Systems	User rules	User actions	Communications	Time	Location	Presence	Sensors	Web services	Actuators
SECE	NL-like rules	Tcl scripts	Call, email, IM	✔	User & buddies	✔	✔	✔	✔
CPL	XML tree	Fixed XML actions	Call	✖	✖	✖	✖	✖	✖
LESS	XML tree	XML actions	Call	✔	✖	✔	✖	✖	X10, vcr
SPL	script	Signaling actions	Call	✖	✖	✖	✖	✖	✖
VisuCom	Graphical UI	Signaling actions	Call	✖	✖	✖	✖	✖	✖
DiaSpec	Java	Java	✔✖	✖✔	✖✔	✖✔	✖✔	✖✔	✖✔
CybreMinder	Form based	Reminder	✖	✔	✔	✖	✔	✖	✖
Task.fm	Time rule	Reminder	✖	✔	✖	✖	✖	✖	✖

Events & actions

Events

- Presence updates
- Incoming calls
- Email
- Calendar entries
- Sensor inputs
- Location updates

Actions

- Control the delivery of email
- Route phone calls
- Update social network status
- Control actuators such as lights
- Reminders (email, voice call, SMS)
- Interact with Internet services

Event language syntax

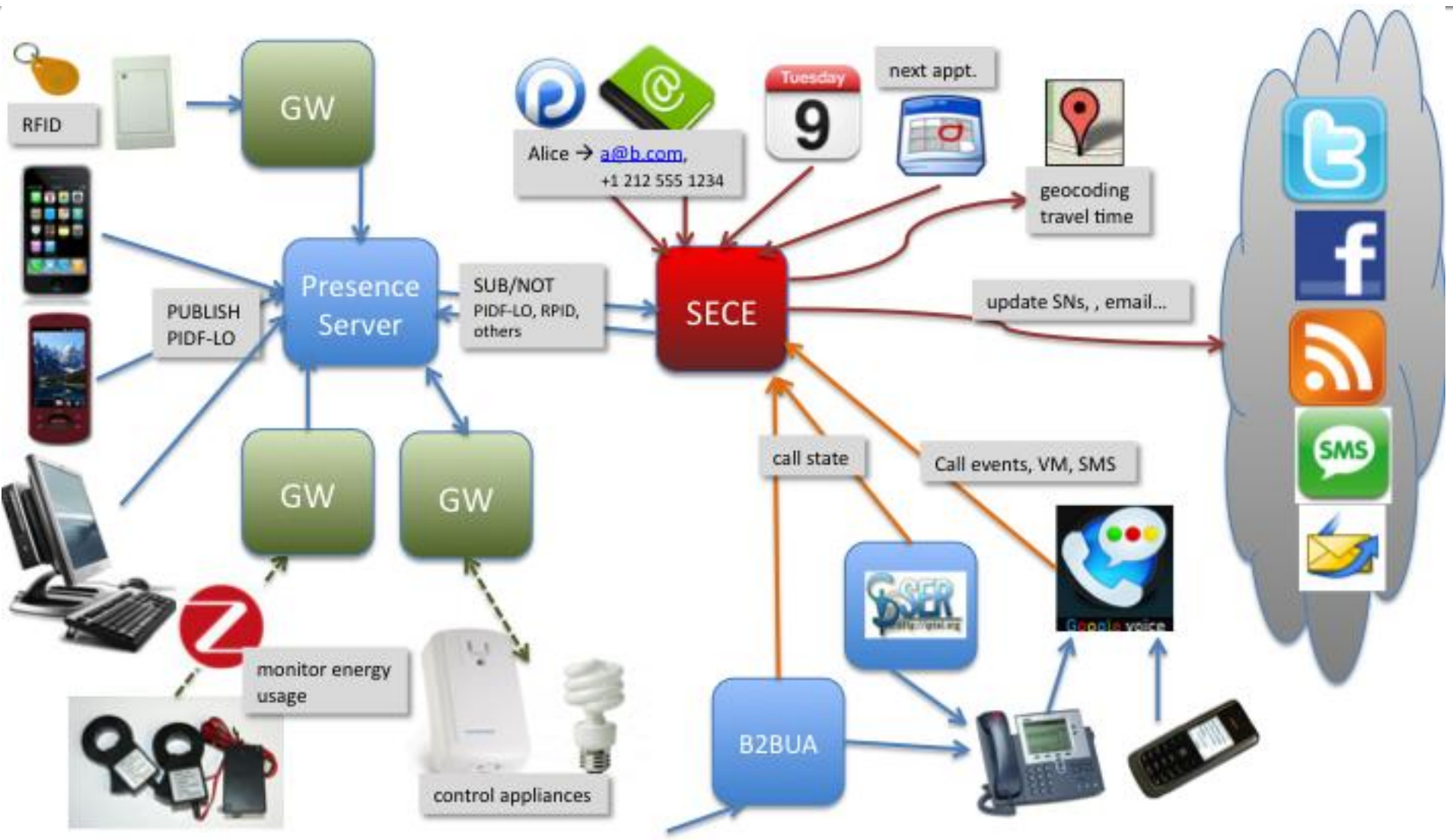
```
every sunset {
   homelights on;
}

every week on WE at 6:00 PM{
   email irt_list “Pizza talk at 6:00 PM today.”;
}

if stock.google > 14 {
   sms me "google stock:"+[stock google];
}
```

Event Rules: More Examples

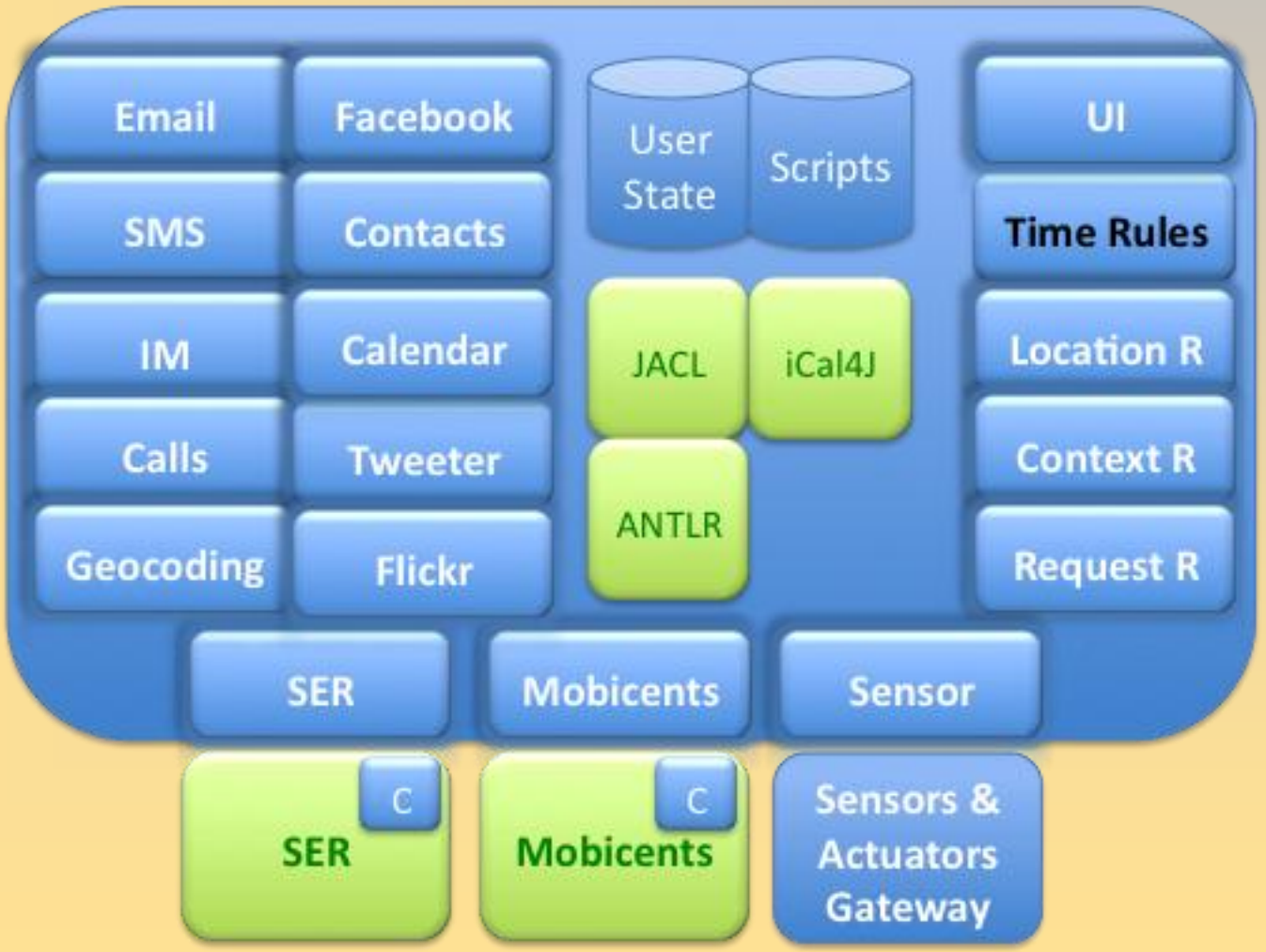
Extensible set of small languages

- Time
  - Single `on February 16, 2010 at 6:00 PM`
  - Recurring `every day at 12:00 until April`
- Location
  - `Tom within 5 miles of me`
- Context
  - `if my office.temperature > 80`
- Communication requests
  - `incoming call`

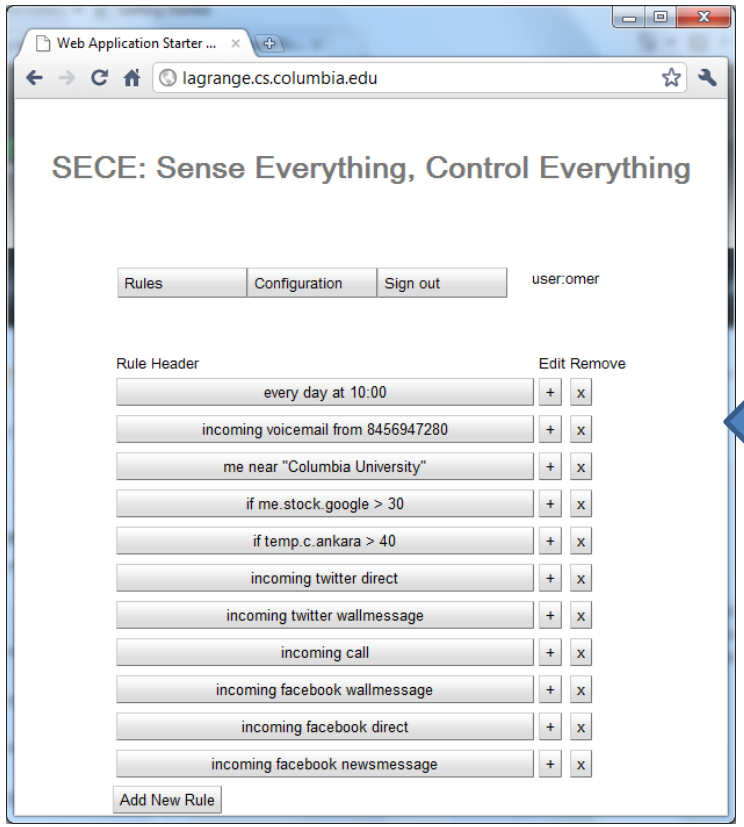
The big picture

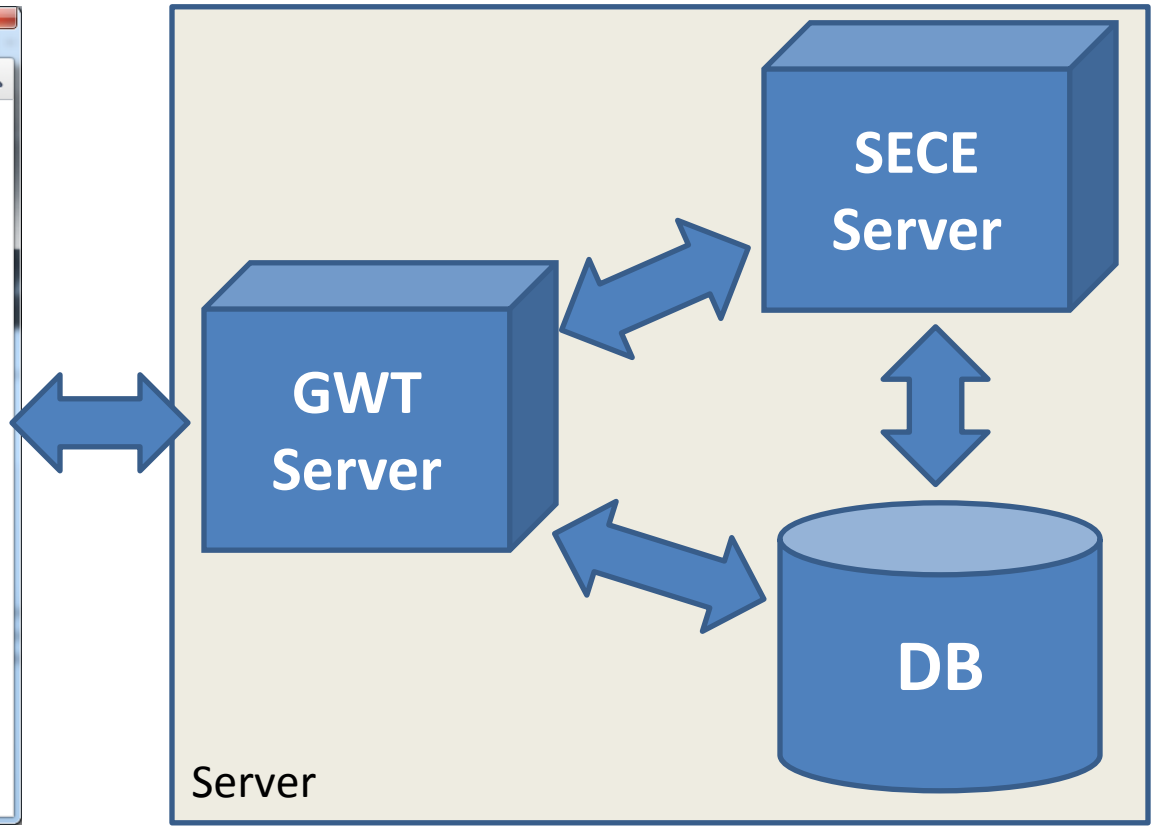


Software architecture

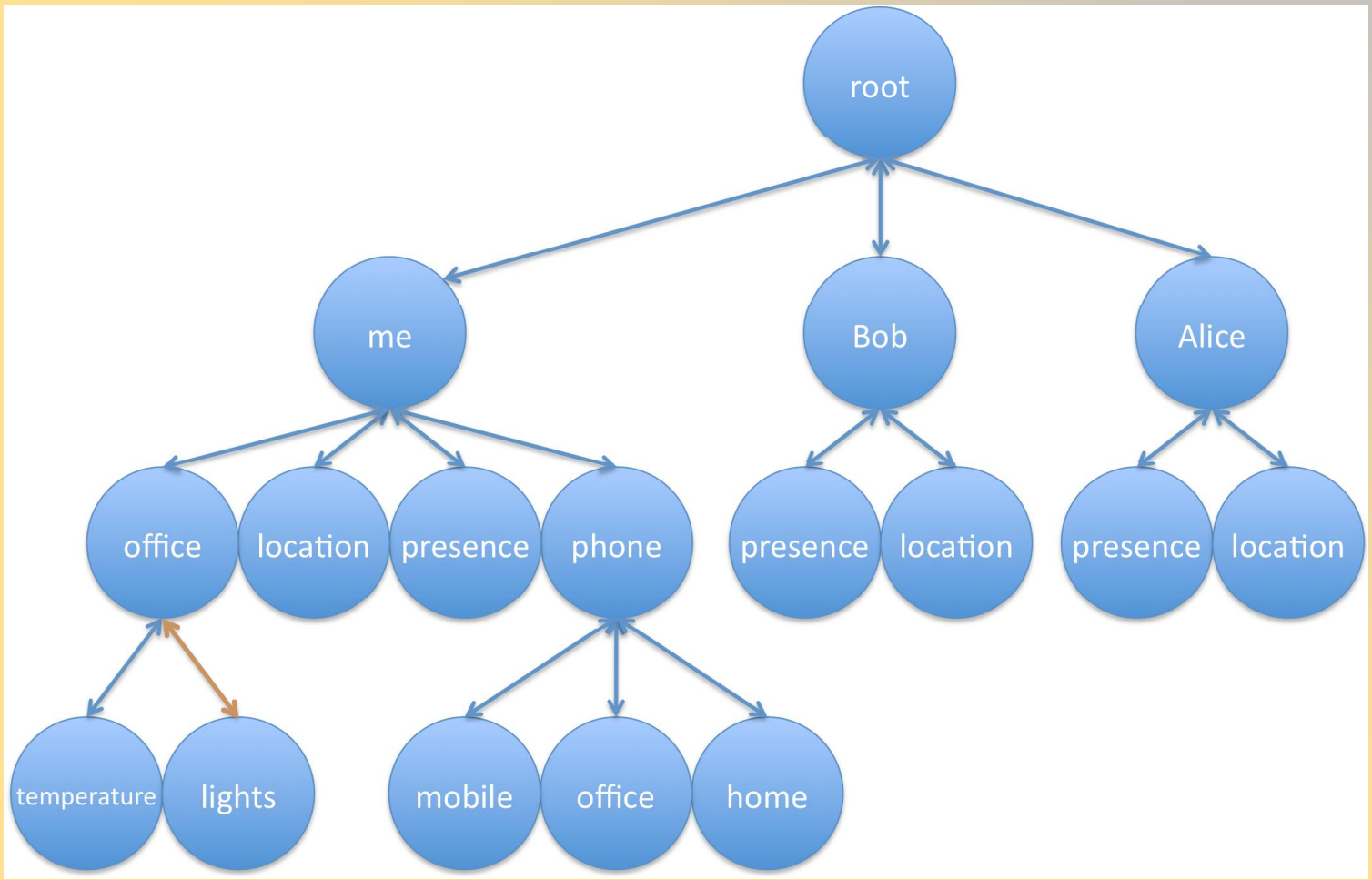


UI (Google Web Toolkit - GWT)





User information registry



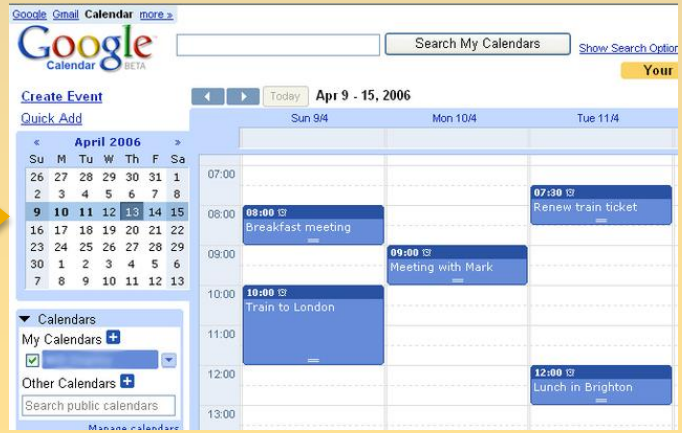
SECE: Time-based rules

Every day at 12:00 from 01/01/2010 until 04/01/2010 {
email employees "lunch time" "Location: 5th floor Dinning Room, Time: 12:30"
}

BEGIN:VCALENDAR
BEGIN:VEVENT
DTSTART;TZID=America/New_York:20100101T12000
o RRULE:FREQ=DAILY;BYHOUR=12;
UNTIL=20100401T120000
END:VEVENT
END:VCALENDAR

SECE

Export / Import



SECE: Location-based rules

user operator location { body }

bob near "Columbia University"
me near 40.807,-73.963

tom within 5 miles of me
me within 3 miles of "2960 Broadway, New York, 10027"

tom in "Rockefeller center"
Me outside of "Manhattan"

bob moved 1.5 miles

- Place types and user-defined locations:

me near a post office
Anne in a museum
me near my tennis club

SECE: Request-based rules

incoming|outgoing **event** *from* **user|address** *to* **address { body }**

missed call from **user|address** *to* **address { body }**

received call from **user|address** *to* **address { body }**

- Event: *call, im, sms*, voicemail*, email (*only incoming)*

```
incoming call {
    if { [my activity] == "on-the-phone"}      forward sip:bob@example.com
}
outgoing call {
   if {[outgoing destination] == "18003456789"}    modify_call destination 12129397054
}
incoming call from Anne {
     if {[my location] != "office"}         auto_answer audio no_office.au –record
}
incoming im {
    sms me [incoming from] + " sent an im:‟ + [incoming content]
}
```

SECE: Social Network Integration

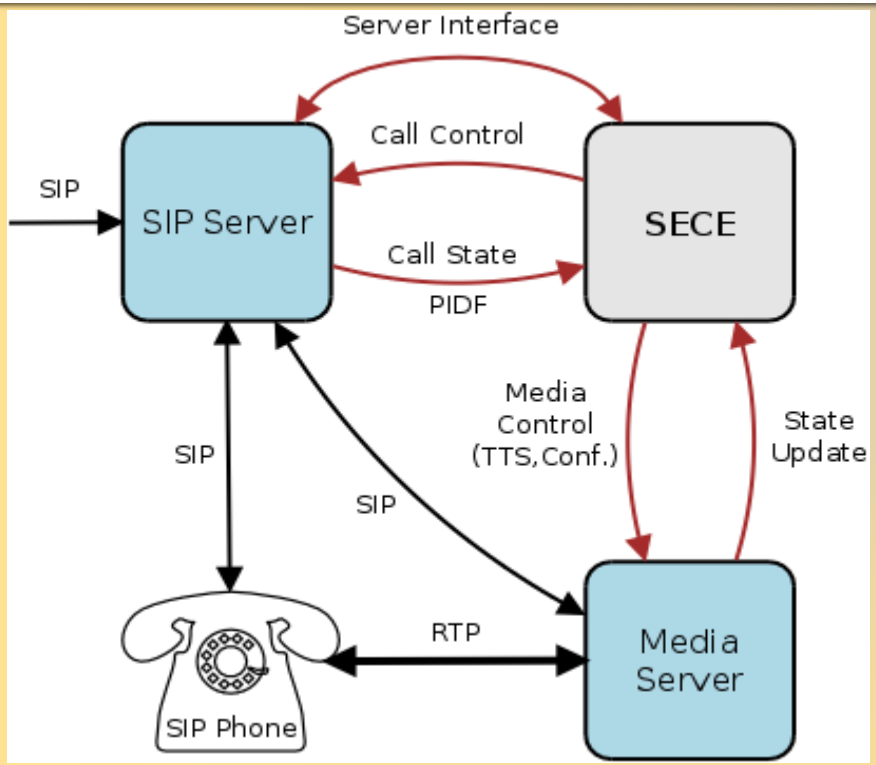
Incoming *social_network* *message_type*

facebook	wallmesssage
twitter	newsmessage
linkedin	direct

social_network *status_update*

facebook
twitter
linkedin

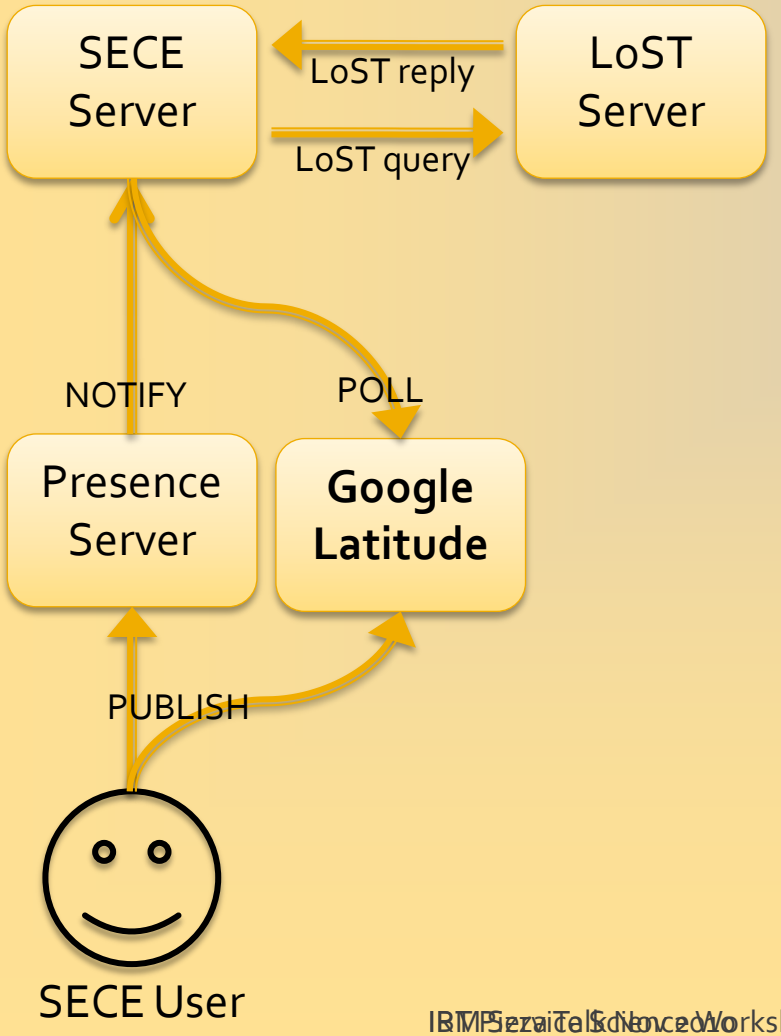
Automated Call Handling



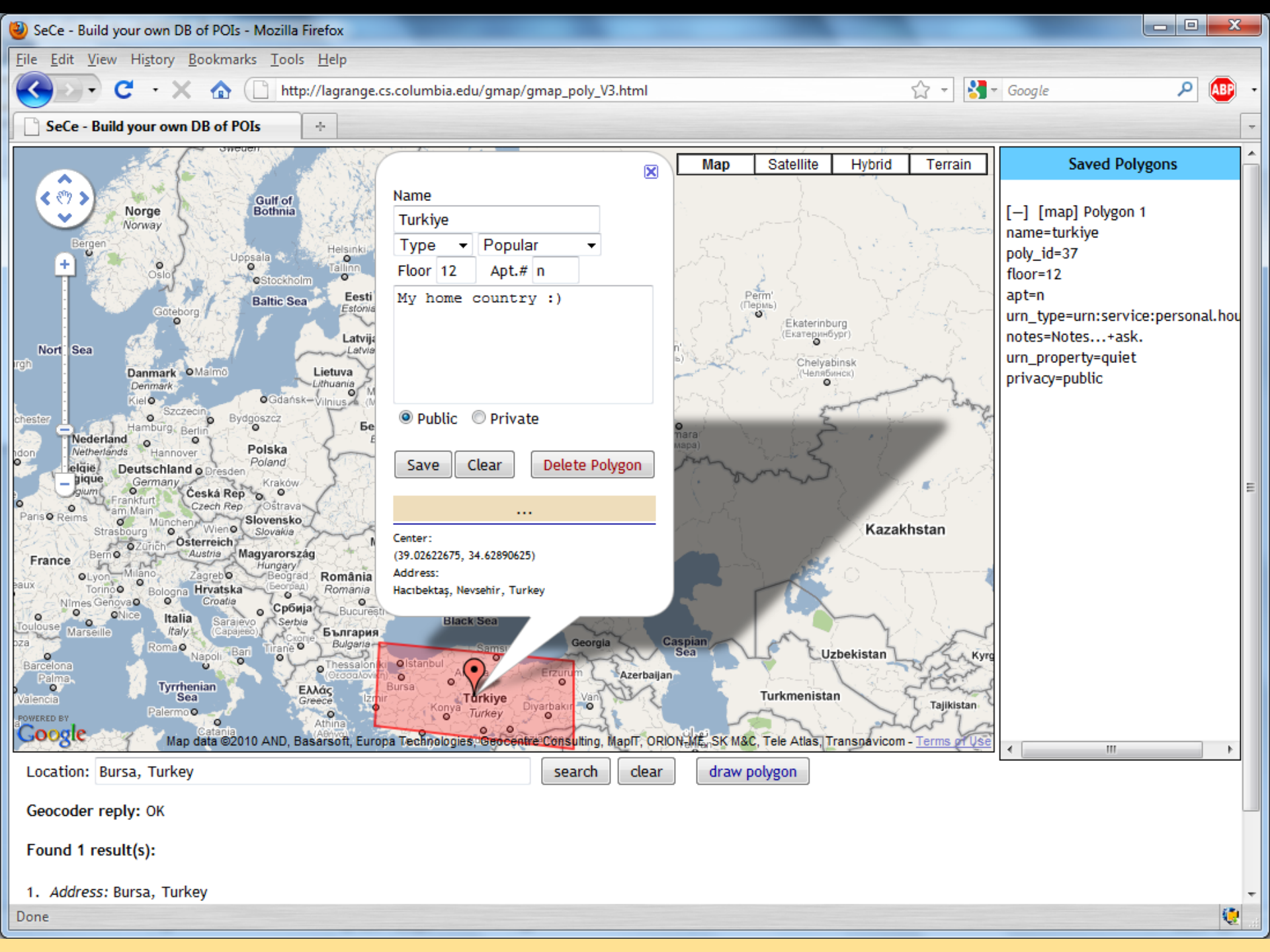
- **Control**: Accept, reject, redirect, forward calls based on variety of SECE signals
- **Integration**: Calendar, address book, PSTN, Google Voice, SMS, location, Text-to-speech, voicemail)
- **Simplicity**: Natural, easy to learn scripting language
- **Flexibility:** Input from a variety of SECE components involved in call handling
- **Automation**: Scripts for recurring tasks (setup a conf. call based on calendar)

"On mom's birthday, call mom when I am home and near phone."
"Setup a conference call, enter password, invite people, ring desk phone."
"If driving and incoming call, play "user driving" and redirect to voicemail."
"If desk phone ringing and not in room, send SMS with caller's number."

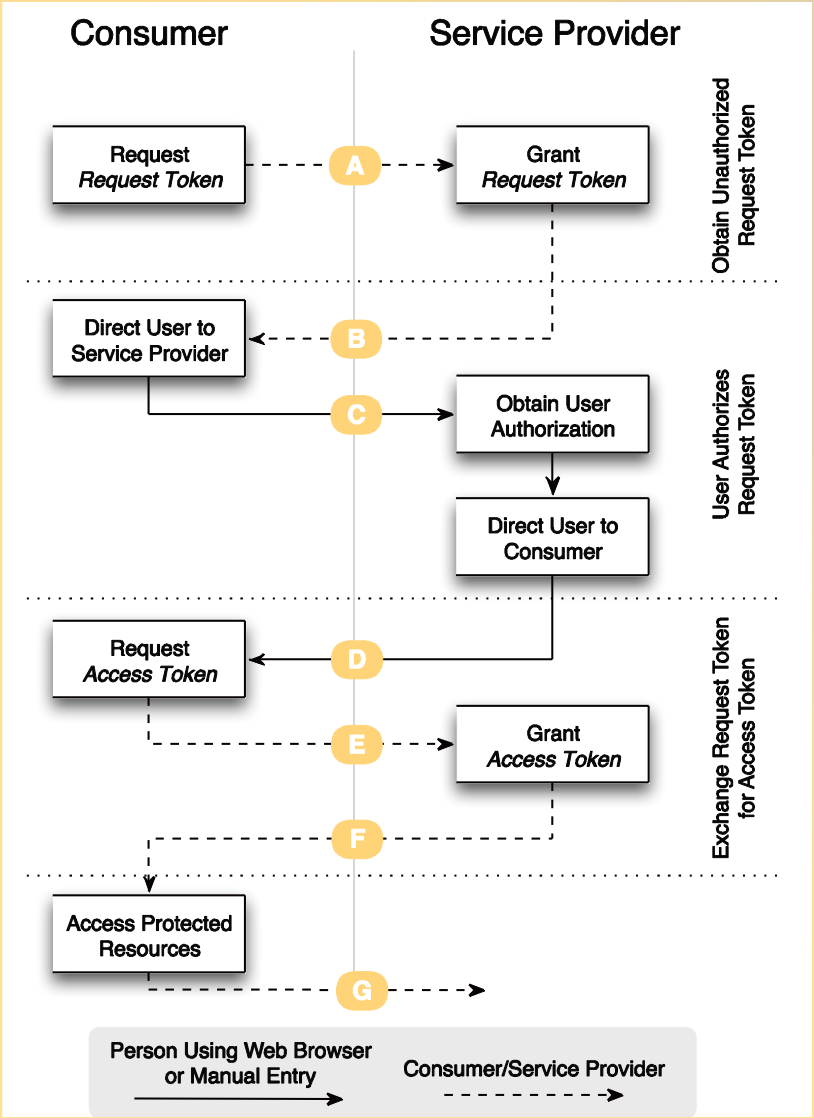
Handling location updates

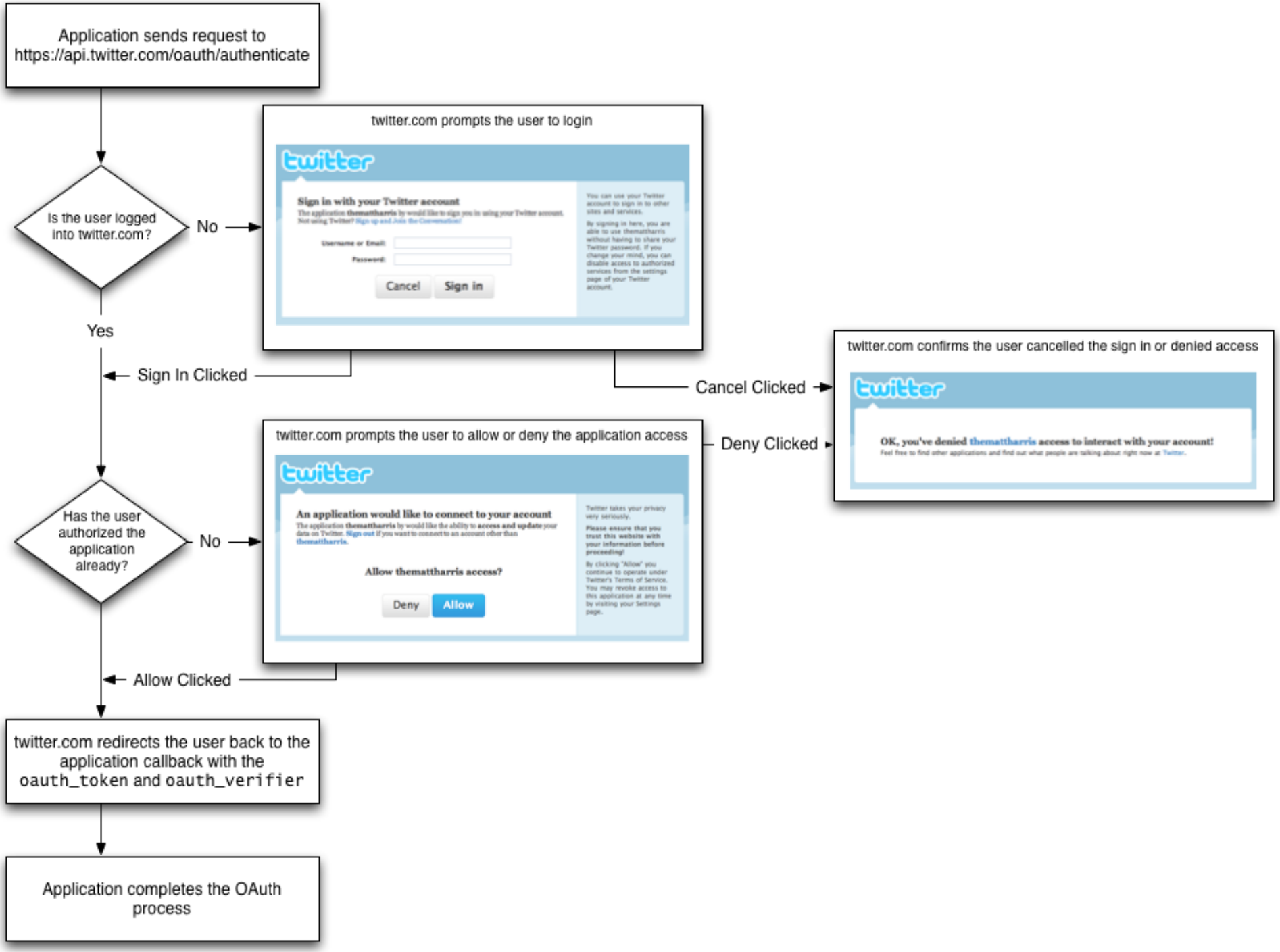


- User
  - publishes his/her location periodically (e.g., every 5 min) to a presence server or to a location service such as Google Latitude
- Presence server
  - notifies changes in location to SECE server
- Google Latitude (or similar service)
  - SECE retrieves user's location periodically
- SECE server
  - depending on user's defined rules, queries LoST server
- LoST server
  - replies with current information on user's surroundings
- SECE server
  - Takes action based on rules and contextual location information

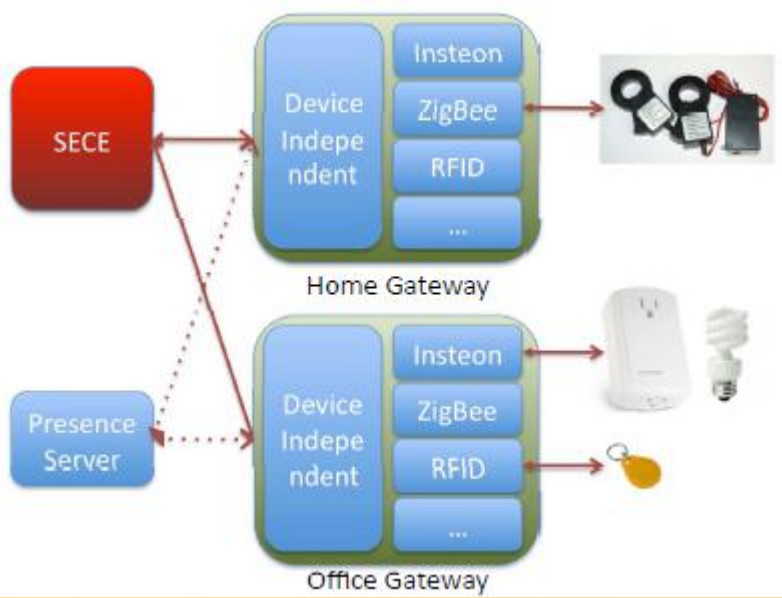

SeCe - Build your own DB of POIs - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://lagrange.cs.columbia.edu/gmap/gmap_poly_V3.html
SeCe - Build your own DB of POIs
Name
Turkiye
Type
Popular
Floor 12
Apt.# n
My home country :)
Public
Private
Save
Clear
Delete Polygon
...
Center:
(39.02622675, 34.62890625)
Address:
Hacıbektaş, Nevsehir, Turkey
Map
Satellite
Hybrid
Terrain
Saved Polygons
[–] [map] Polygon 1
name=turkiye
poly_id=37
floor=12
apt=n
urn_type=urn:service:personal.hou
notes=Notes...+ask.
urn_property=quiet
privacy=public
Map data ©2010 AND, Basarsoft, Europa Technologies, Geocentre Consulting, MapIT, ORION-ME, SK M&C, Tele Atlas, Transnavicom - Terms of Use
Location: Bursa, Turkey
search
clear
draw polygon
Geocoder reply: OK
Found 1 result(s):
1. Address: Bursa, Turkey
Done

OAuth


Consumer
Service Provider
Request
Request Token
A
Grant
Request Token
Obtain Unauthorized
Request Token
Direct User to
Service Provider
B
C
Obtain User
Authorization
Direct User to
Consumer
User Authorizes
Request Token
Request
Access Token
D
E
Grant
Access Token
F
Exchange Request Token
for Access Token
Access Protected
Resources
G
Person Using Web Browser
or Manual Entry
Consumer/Service Provider


Application sends request to https://api.twitter.com/oauth/authenticate
Is the user logged into twitter.com?
No
Yes
twitter.com prompts the user to login
Sign in with your Twitter account
Username or Email:
Password:
Cancel
Sign in
Sign In Clicked
Cancel Clicked
twitter.com confirms the user cancelled the sign in or denied access
OK, you've denied themattharris access to interact with your account!
Deny Clicked
twitter.com prompts the user to allow or deny the application access
An application would like to connect to your account
Allow themattharris access?
Deny
Allow
Has the user authorized the application already?
No
Allow Clicked
twitter.com redirects the user back to the application callback with the oauth_token and oauth_verifier
Application completes the OAuth process

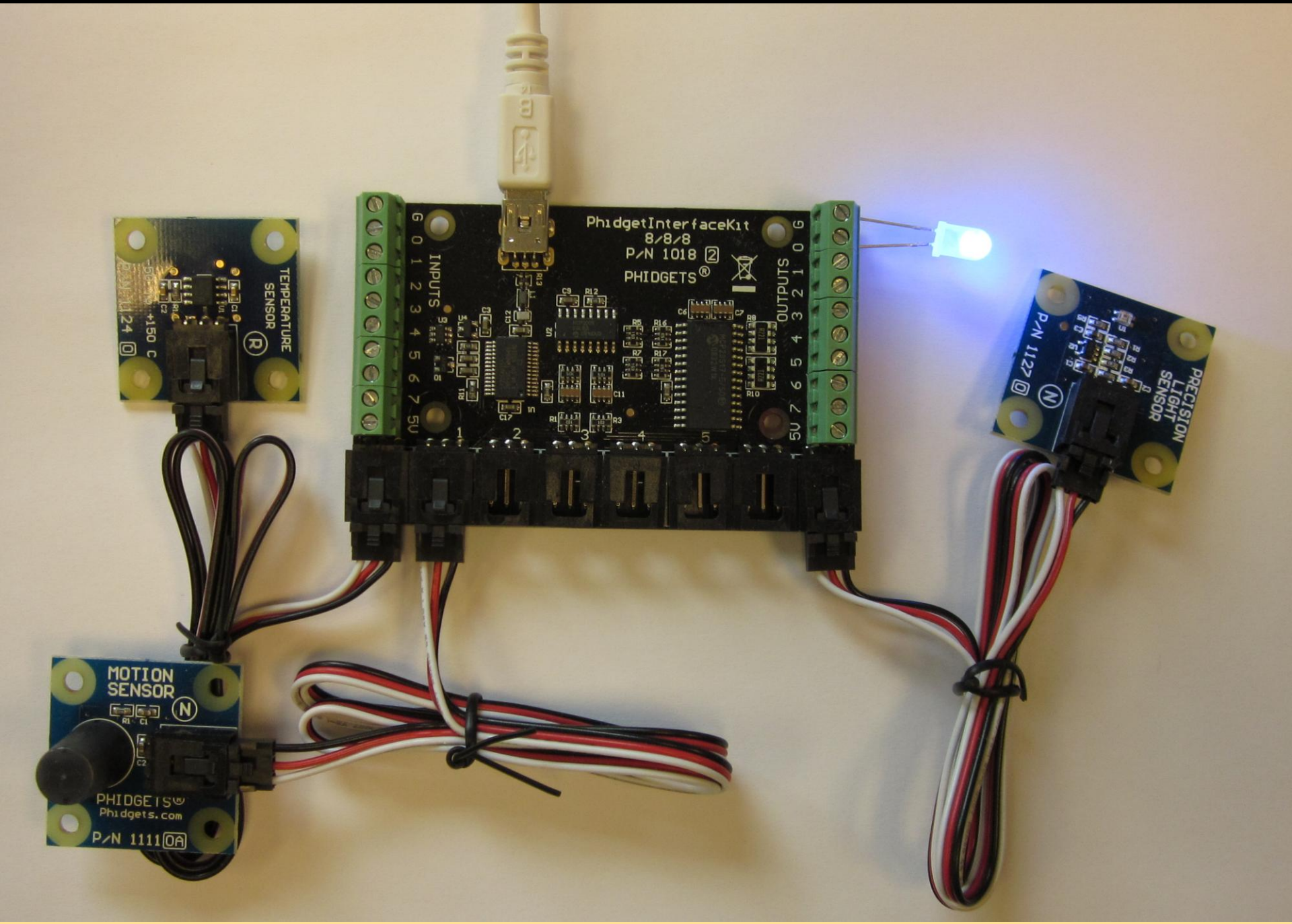
Sensors and Actuators



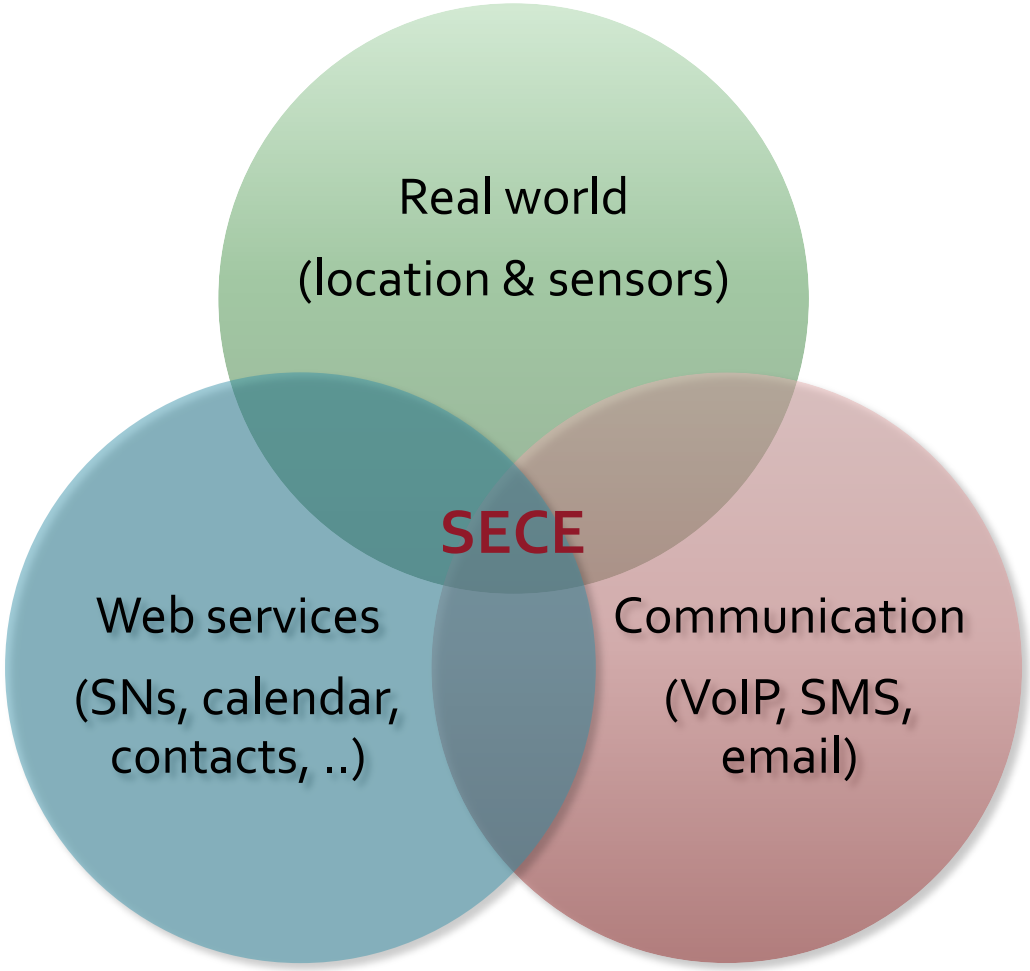
Sensors: smoke, light, humidity, motion, temperature and RFID readers

Actuators: networked devices and actuators such as lights, cameras, sprinklers, heaters, and air conditioners

```
if my office.temperature > 80 {
    ac on;
}
if my office.smoke equals true {
    sprinklers on;
    sms me "fire in the office";
    call_tts fire-department "fire in the "+[get me.office.address];
    electrical-appliances off;
}
if my warehouse.motion equals true {
    sms me "person in the warehouse."
}
```


PhidgetInterfaceKit
8/8/8
P/N 1018
PHIDGETS
INPUTS
OUTPUTS
TEMPERATURE SENSOR
MOTION SENSOR
PHIDGETS
Phidgets.com
P/N 1111
PRECISION LIGHT SENSOR
P/N 1127

Conclusion


Real world
(location & sensors)
SECE
Web services
(SNs, calendar, contacts, ..)
Communication
(VoIP, SMS, email)