Design and Implementation of Mobile Applications

2016-17

Luciano Baresi
... it is always the same story ;-(
Luciano Baresi

- Professor @ DEIB
- Previously
  - Researcher at Cefriel
  - Visiting researcher
    • University of Oregon (USA)
    • University of Paderborn (Germany)
- Research interests
  - Software engineering
    • Dynamic software architectures
    • Service- and cloud-based systems
    • Mobile applications

home.deib.polimi.it/baresi
Our course
Our Course

- Taught in English

- No text book
  - Several ones could be interesting
  - Online material better than any book
  - Slides are available through my web page
    http://home.deib.polimi.it/baresi/dima.htm
When/Who

- Wednesday: 8:30-10 (N02)
- Thursday: 8:30-10 (EG3)

- Teaching assistant
  - Giovanni Quattrocchi

- External guests (from industry)
  - Microsoft, Telecom, Samsung, …
Key ingredients

• Mobile application design
• Android
• iOS
• Cross-platform development
  — Xamarin, PhoneGap, ecc.
• A bit of Wearables
Final exam

• Project negotiation (not before end of November)
  – You propose an idea
  – Some proposals may be available

• Some comments
  – Novelty of idea is not key
  – 1 or 2 people (exceptionally 3 persons)
  – Expectations are becoming higher and higher
    • Complexity, graphical layout, “multi-device” support, testing, quality of documentation
Final exam

• Project discussion (six dates per year)
  – Design and documentation (printed or by email)
  – Presentation (brief introduction and design decisions)
  – Demo (real device or simulator)

• Some comments
  – No marketing strategies
  – Professional design document
  – Synergies are encouraged
I would like to get

- A well-engineered significant app
  - Some screens (significant application flow)
  - Multiple threads
  - Interaction with external services (not just Facebook)
  - “Nice” look and feel
  - Support for different classes of devices
- Some comments
  - Earlier does not mean higher grades
  - Details matter
- You keep any possible right on the app
A bit of history
It is not just this
Dr. Martin Cooper of Motorola, made the first US analogue mobile phone call on a larger prototype model in 1973
Phablets
Mobile Backend-As-A-Service (MBaaS)

Enterprise-Grade Cloud Services
Create rich app experiences without having to worry about back-end functionality

Identity  Integration  Orchestration  Messaging  Sync  Storage
... and some numbers
DIGITAL IN 2016
WE ARE SOCIAL’S COMPENDIUM OF GLOBAL DIGITAL, SOCIAL, AND MOBILE DATA, TRENDS, AND STATISTICS
SIMON KEMP • WE ARE SOCIAL
MOBILE CONNECTIONS
THE NUMBER OF MOBILE CONNECTIONS COMPARED TO POPULATION

SOURCEs: GSMA Intelligence; UN, US Census Bureau for population data.
DIGITAL DEVICE OWNERSHIP

PERCENTAGE OF THE ADULT POPULATION* THAT OWNS EACH KIND OF DEVICE

MOBILE PHONE (ALL TYPES) 95%
SMART PHONE 62%
LAPTOP OR DESKTOP COMPUTER 65%
TABLET DEVICE 21%

TV STREAMING DEVICE 6%
HANDHELD GAMING CONSOLE [N/A]
E-READER DEVICE 3%
WEARABLE TECH DEVICE 1%

*Source: Google Consumer Barometer 2015. Figures based on responses to a questionnaire. *Please see notes at the end of the report for definitions.
Worldwide mobile app revenues in 2015, 2015 and 2020 (in billion U.S. dollars)

Source: © Statista 2016

Additional Information:
Worldwide; 2015; Amount consumers spend on mobile apps via stores
The Average Smartphone User Has Installed 26 Apps
Top 10 countries with the highest average number of installed apps per smartphone user*

<table>
<thead>
<tr>
<th>Country</th>
<th>Paid Apps</th>
<th>Free Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Korea</td>
<td>2.7</td>
<td>37.4</td>
</tr>
<tr>
<td>Switzerland</td>
<td>9.4</td>
<td>30.4</td>
</tr>
<tr>
<td>Sweden</td>
<td>8.9</td>
<td>30.4</td>
</tr>
<tr>
<td>Singapore</td>
<td>6.3</td>
<td>31.2</td>
</tr>
<tr>
<td>Japan</td>
<td>17.5</td>
<td>18.9</td>
</tr>
<tr>
<td>Australia</td>
<td>10.9</td>
<td>22.5</td>
</tr>
<tr>
<td>Denmark</td>
<td>6.3</td>
<td>26.6</td>
</tr>
<tr>
<td>United States</td>
<td>7.5</td>
<td>25.3</td>
</tr>
<tr>
<td>Norway</td>
<td>9.3</td>
<td>23.2</td>
</tr>
<tr>
<td>France</td>
<td>3.5</td>
<td>28.7</td>
</tr>
<tr>
<td>Global Average</td>
<td>5.6</td>
<td>20.6</td>
</tr>
</tbody>
</table>

*as of March 2013; n=1,000 for all countries

Source: Google's Our Mobile Planet
- **2020**:
  - World Population: 7.6 Billion
  - Connected Devices: 50 Billion
  - Connected Devices Per Person: 6.58

- **2015**:
  - World Population: 7.2 Billion
  - Connected Devices: 25 Billion
  - Connected Devices Per Person: 3.47

- **2010**:
  - World Population: 6.8 Billion
  - Connected Devices: 12.5 Billion
  - Connected Devices Per Person: 1.84

- **2003**:
  - World Population: 6.3 Billion
  - Connected Devices: 500 Million
  - Connected Devices Per Person: 0.08

Source: Cisco IBSG, April 2011
<table>
<thead>
<tr>
<th>Operating System</th>
<th>2Q16 Units</th>
<th>2Q16 Market Share (%)</th>
<th>2Q15 Units</th>
<th>2Q15 Market Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Android</td>
<td>296,912.8</td>
<td>86.2</td>
<td>271,647.0</td>
<td>82.2</td>
</tr>
<tr>
<td>iOS</td>
<td>44,395.0</td>
<td>12.9</td>
<td>48,085.5</td>
<td>14.6</td>
</tr>
<tr>
<td>Windows</td>
<td>1,971.0</td>
<td>0.6</td>
<td>8,198.2</td>
<td>2.5</td>
</tr>
<tr>
<td>Blackberry</td>
<td>400.4</td>
<td>0.1</td>
<td>1,153.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Others</td>
<td>680.6</td>
<td>0.2</td>
<td>1,229.0</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>344,359.7</strong></td>
<td><strong>100.0</strong></td>
<td><strong>330,312.9</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source: Gartner (August 2016)
We often hear that the main barrier for mobile enabling enterprise services is security concerns. With mobile devices being used over open connections, devices getting lost, apps being installed on employee devices, constant hack attempts, the ability to reverse engineer code, the vulnerability of connected devices (IoT) and other security threats the organisations simply don't think that the opportunities outweigh the risks yet.
Complex devices

- Accelerometer
- Gyroscope
- Digital compass
- Global Positioning System (GPS)
- Barometer
- Ambient light
- Proximity Sensor
Many different languages

- Objective-C/Swift (iOS)
- Java (Android)
- C# (Windows Mobile, cross-platform development)
- HTML5 (Tizen, cross-platform development)
- JavaScript (cross-platform development)
- C++ (Tizen)
Mobile Applications

• Software that can be pushed to a mobile device or downloaded and installed locally to serve some needs
  – **Browser-based** applications are developed in a markup language
  – **Native** applications are compiled solutions (device has a runtime environment)
  – **Hybrid** applications exploit the best of both worlds (a browser is needed for discovery)
Quality !!!!
Italy has competed in every edition except...

**GOLD - 8**

- **Fabio BASILE**
  - Judo
  - Men -66 kg

- **Daniele GAROZZO**
  - Fencing
  - Men's Foil Individual

- **Niccolo CAMPRIANI**
  - Shooting
  - 10m Air Rifle Men

- **Diana BACOSI**
  - Shooting
  - Skeet Women

- **Gabriele ROSSETTI**
  - Shooting
  - Skeet Men
Mobile app design

• A mobile app should do one thing and do it well
• A mobile app should be as simple as possible, but no simpler
• Different versions (families of applications)