ESPRESSO TUTORIALS

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SAP® OpenUI5 for Mobile BI and Analytics

- Delve into the foundations of CSS, HTML5, and jQuery
- Use open source library d3.js to create custom data visualizations for bar, line, and pie charts
- Learn how to build a seamless mobile BI app using SAP OpenUI5
- Build web apps using real world scenarios and test layout options for different mobile devices

Table of Contents

Preface **9**

Personal dedication 9

1 Introduction to SAP OpenUI5 for Mobile BI **11**

1.1 Mobile BI software 12

1.2 HTML5 to bridge the gap 14

1.3 Chapter overview 14

2 Mobility and BI **19**

2.1 The evolution of mobile devices 20

2.2 The big data explosion 22

2.3 Real-time access to information 24

2.4 The death of Adobe Flash? 27

2.5 Culture and BI maturity 28

3 Design Thinking **33**

3.1 Information architecture 35

3.2 Use case scenarios 37

3.3 Summary 51

4 HTML5 for any screen size, browser and device **53**

4.1 The age-old browser compatibility issue 54

4.2 Android, iOS, Blackberry and Windows 55

4.3 Wearables and IoT 56

4.4 Screen resolution and touchscreen interfaces 56

4.5 Agile and rapid application development (RAD) 60

4.6 Native vs. browser-based apps 62

4.7 Overview of jQuery Mobile 66

4.8 SAP OpenUI5 Introduction 76

5 Building the HTML5 Skeleton 79
5.1 Web standards 79
5.2 HTML basics 82
5.3 New to HTML5 100
5.4 Formatting and styling with CSS 104
5.5 Layout options 113
5.6 Going offline 115

6 SAP OpenUI5 Stack 117
6.1 Getting started with OpenUI5 117
6.2 Overview of the OpenUI5 stack 121
6.3 Full screen vs. split screen 184

7 Graphs, Charts and Maps 187
7.1 Design guidelines and data visualization tips 187
7.2 Open source charts and graphs 195
7.3 Adding graphs and charts to our web app 200
7.4 APIs: geo-location and Google Maps 222

8 Displaying data from multiple sources 227
8.1 Relational vs. NoSQL 227
8.2 A look at server-side scripting 230
8.3 Connecting to Oracle, MySQL 233
8.4 OData application 240
8.5 Overview of IndexedDB API 245

9 Security and Privacy 247
9.1 Security threats 248
9.2 Mitigation efforts to secure software 252
9.3 Privacy concerns 254
9.4 Data storage: cloud vs. device 254
9.5 Current trends and recommendations 255

10 Testing and Optimization **257**
10.1 Testing mobile apps 257
10.2 Simulators 259
10.3 Caching and compression 264
10.4 Debugging 268

11 The Future of HTML5 and Mobile BI **273**
11.1 Greater adoption of HTML5 273
11.2 Augmented reality 274
11.3 Mobile development takes precedence 276

12 Free Wire Frames, Mockups and Storyboards **277**
12.1 Metro layout 277
12.2 Three columns with focus 278
12.3 Three columns with header and footer 279
12.4 Mobile navigation layout options 279
12.5 Two columns with left sidebar 280

13 OpenUI5 starter kit (download) **281**

A The Author **284**

B Index **285**

C Disclaimer **291**

2 Mobility and BI

In 2014, the number of mobile devices exceeded the world's population. According to GSMA Intelligence, there were 7.2 billion mobile devices and roughly 7.19 billion people. Since then, the number of devices has grown significantly and stands closer to 8 billion, while population growth has reached approximately 7.6 billion. Also noteworthy in 2014 was that the number of mobile internet users overtook desktop users (see Figure 2.1). These are telltale signs for the future.

The year 2014 has been dubbed the "mobile revolution"' and there is no indication of this losing momentum. Mobile ecommerce is growing exponentially and a study published in September 2014 on blog.kissmetrics.com (*https://blog.kissmetrics.com/surprising-mobile-ecommerce/*), showed that 78 percent of business searches on a mobile phone resulted in a purchase. Tablets came in second with 64 percent and personal computers and laptops were third at 61 percent.

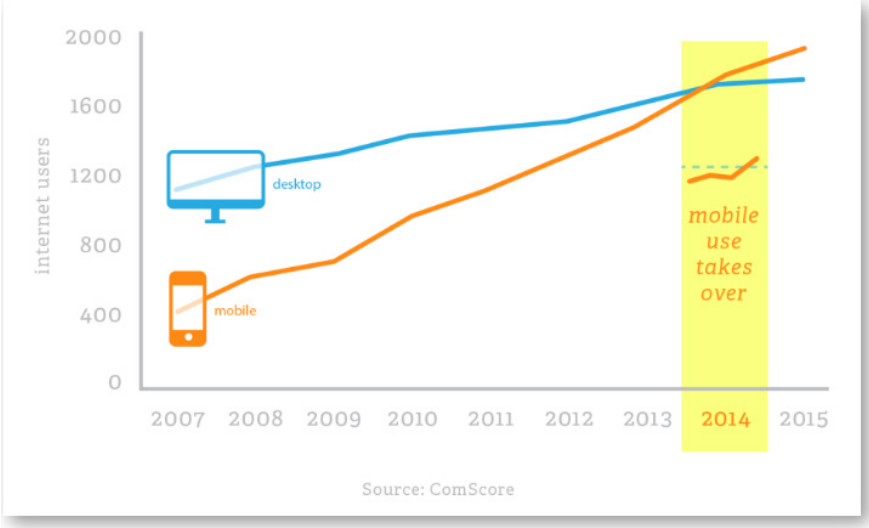

Figure 2.1: The growth of mobile and desktop internet users via ComScore

The most interesting statistic that has influenced the writing of this book is that customers prefer mobile websites to native apps. While it is documented that users spend up to 90 percent of their time in apps, 70 percent of users prefer to use mobile websites. Therefore, a good strategy would be to improve your mobile web experience as opposed to investing in more mobile apps; with HTML5, users have the best of both worlds with very little compromise.

2.1 The evolution of mobile devices

Historians note that Alexander Graham Bell invented the telephone in 1876 and held the first patent. Communication flourished via this new medium but it was confined by chords attached to non-portable devices. It took almost a century for the invention of the first mobile phone prototype by Motorola, and it was used to make a call in 1973.

In less than five decades, we have seen exponential growth and adoption of the mobile phone with incredible improvements and refinements. Today, we use the term “smartphones” to represent the new era of mobile devices. The IBM Simon was touted as the first smartphone back in 1993 because it had the capabilities of a phone, pager, fax machine and Personal Digital Assistant (PDA). Fast forward to 1999 and the Nokia 3210, which was one of the most popular mobile phones in history, with over 160 million handsets sold. Blackberry launched the 5810 in 2002, merging a phone with a data-only handset; and in 2007, Apple launched the first iPhone with quad-band GSM connectivity with GPRS and EDGE capabilities. A year later, Apple launched the iPhone 3G and since then, digital transformation growth has been exponential.

As mentioned at the beginning of this chapter, the gross number of mobile devices has exceeded the world’s population. However, the number of unique subscribers still stands at less than 5 billion, indicating that there is an average of 1.5 mobile devices per subscriber. According to GSMA Mobile Economy reporting (gsma.com), the penetration rate for unique subscribers in 2016 was 65 percent and is closer to 100 percent when we look at gross global connections. The number of unique mobile subscribers by 2020 is projected to be 5.7 billion, with a penetration rate of 73 percent.

Definitions

Feature Phone is a term to describe a class of mobile phone. The term is typically used to describe low-end mobile phones which are limited in capabilities in contrast to modern smartphones such as the iPhone. Feature phones typically provide voice calling and text messaging functionality in addition to basic multimedia and internet capabilities, and other services offered by the user's wireless service provider. *Source: Wikipedia*

A **Smartphone** is a mobile phone with an advanced mobile operating system which combines features of a personal computer operating system with other features useful for mobile or handheld use. Smartphones, which are usually pocket-sized, typically combine the features of a cell phone, with those of other popular digital mobile devices such as personal digital assistants (PDAs) (e.g. event calendar, media player, video games, GPS navigation, digital camera and digital video camera). *Source: Wikipedia*

The most interesting change is the rapid increase in smartphone adoption, coupled with data and broadband growth. In recent years, the sale of smartphones has outstripped feature phones, however global smartphone penetration stands at 40 percent compared to 60 percent for feature phones. While there are challenges associated with the increased use of mobile devices — such as battery life, security, and more alarming concerns linked to health, sleep, social aversion and driving — this has not slowed the adoption of mobile devices and there is no sign that it will be slowing down anytime soon.

Today, a mobile phone is not a rare and expensive commodity like it was forty years ago. The focus has now shifted to smartphone penetration versus feature phones. Smartphones are a marketer's dream because they can create more targeted campaigns and use location-based technologies via mobile apps or websites to drive traffic and increase sales. The global growth in internet penetration is helping to drive the shift to data and broadband, which in turn cannibalizes traditional voice services. But where there is a downturn, there is great opportunity.

2.2 The big data explosion

If the mobile revolution was prodigious, then the proliferation of big data is a modern phenomenon. Throughout history, libraries have been mankind's main source of organized collections of information and data that are easily accessible in a physical space. Items ranging from books, films, maps and newspapers to ancient artifacts such as tablets and manuscripts can all be found there; and today, even more content exists in modern libraries.

The need to collect, store and retrieve data is not a new sensation. However, advancements in technology have led to enormous growth in data, presenting new challenges and obstacles. In addition to the explanation of big data in Chapter 1, there are four distinct characteristics that help define it. Originally documented as the "3Vs" (volume, variety and velocity), recent trends have led to a fourth "V" due to growing concern regarding how we sift through mammoth volumes of data to find valuable information. Some persons also argue that a fifth "V" — veracity speaks to the quality and trustworthiness of big data. For this book, we will focus on the following four characteristics of big data:

- *variety* — new and different data streams that should be stored and processed for insight
- *volume* — the amount of data generated, which is currently outgrowing traditional storage capacity
- *velocity* — speed at which data is generated to facilitate real-time analytics and decision making
- *value* — identifying valuable data for extraction and analysis

The term big data emerged in the 1990's in scholarly articles and research papers. Big data was a 10-billion-dollar market in 2013, expected to increase to 53 billion in 2017 and projected to reach 76 billion in 2020. The most staggering numbers for big data are that 90 percent of the world's data was created in the last two years alone and 80 percent of the world's data is unstructured, unlike our earlier libraries and traditional databases.

There are 50 million tweets daily and almost 3 million emails sent every second; and these numbers continue to grow and intensify the complexi-

ty of big data. The widespread impact of big data is evidenced in job market demand and the high salaries for the elusive data scientist who possesses the blended skillsets of a PHD in Statistics and Computer Science coupled with an MBA. The reality is that we cannot matriculate enough students to meet this growing demand for analysts, data engineers and scientists. In addition, the major component lagging in this big data revolution is the technology to support growth and demand for data.

There has been significant progress in machine learning, NoSQL and artificial intelligence that has helped to ease some of the challenges with data storage, analysis and interpretation. However, we still have enormous challenges ahead because the growth of data's variety, volume and velocity has outstripped our ability to keep pace and compete effectively. In addition to complexity, security and privacy, there are major challenges associated with big data as organizations collect and analyze data on individuals, sometimes with no opt-in/opt-out options. Big data should be a focal point when you build a mobile application and while not all data stored may meet the characteristics listed previously, you should consider a big data strategy and how best to pursue the demand and growth of its swiftly changing requirements. Some experts argue that the benefits and opportunities provided by big data far outweigh the challenges, and while I do agree, the explosion is yet to be contained and meaningfully exploited.

2.2.1 Data architecture for mobile BI

Storing, processing and retrieving information are vital components of mobile BI. Traditional data warehouses storing historical data usually have a data lag when handling extract, transform and load (ETL) processes, sometimes 24 to 48 hours, which poses a challenge for real-time or near real-time analysis. Heavier reliance on automated processes can result in improvements in accessing information but this is more suited for structured data that has a constant standard format. We could also take a hybrid approach, where we look at information from our existing data warehouse compared to real-time transactions from our CRM or other transactional systems.

There are different technologies and architecture implementation options that can be used to provide a robust data layer for mobile BI, and com-

B Index

A

Adobe Flash 27
aggregations 136
agile method 60
Airline 45
American National Standards Institute (ANSI) 79
analysis latency 25
anchor (a) element 94
Android 55
Apache Cordova 55, 56
API 16
App.view.xml 132, 133, 138, 141, 145, 150
AppCache 264
Apple 20
area chart 192
ARPU 122
article element 101
artificial intelligence 23, 26, 274
ASP.net 233
associations 136
async 266
Atom 240
attachInit() 122
audio tag 102
augmented reality 274
Awe.js 274

B

Banking and finance 41
bar chart 205
bar charts 189
base element 95
Behavioural layer 80
best practices 187
BI dashboards 187
BI maturity 28
Big data 12
black box testing 253
Blackberry 20
blockquote 89
body element 84
bootstrapping 123
bottom-up information architecture 36
Brackets 271
brainstorming 35
Browser compatibility 54
browser revolution 53
bubble chart 193
bullet chart 194
business intelligence 11
BYOD 29, 254
BYOD (Bring Your Own Device) 29

C

C Sharp (C#) 232
Cache buster 266
caching 264
canvas 102
canvas element 91, 198
Cascading Style Sheets (CSS) 104
Cassandra 230
CDN 118

CDN (content delivery network) 66
ChartJS 198
Chrome's developer tools 259
Cloud BI 273
cloud storage 255
column graph 189
compatibility 257
Component.js 133, 146, 151
continuous improvement 257
controller.js 129, 141, 145
CRM 23
CRUD operations 259
CSS 157
CSS box model 109
CSS selectors 111
custom control 202
custom CSS 156

D

D3 geo-mapping 223
D3.js 195, 200
data architecture 24
data binding 131
data engineers 23
data governance 28
data latency 25, 255
Data latency 25
data scientist 23
data visualization 187
data warehouses 23
data.json 139
data-role 68
dc.js 196
debug 262
debugging 271
debugging tools 268
decision latency 25
Define 35
definition list 93
design thinking 33
Design Thinking 15, 33, 37
disruptive data 11
div element 90
Django 232
DOCTYPE 15, 77, 82, 83, 85, 88, 103, 121
document databases 230
document object model (DOM) 92, 195
dygraphs 198

E

Empathize 34
encryption 249
Enterprise Mobility Management (EMM) 256
External style sheets 108
extract, transform and load (ETL) 23

F

Feature Phone 21
field validations 257
Fiori 118
Firefox developer tools 263
FlexBox 208
footer 103
form tag 99
four characteristics of big data 22
Fragment 96
full screen 184
FusionCharts 200

G

Gartner 255, 273
GeoJSON 223
geo-location API 222
getRouterFor(this) 178
GitHub Atom 271
Google Charts 197
Google Chrome 53
Google Maps 222
graph stores 230
grey box testing 253
grunt 267

H

HANA Cloud Platform 77
head element 84
header 103
Headings 87
Highcharts 197
htdocs 120
HTML basics 82
HTML5 root element 83
hybrid apps 62

I

i18n.properties 149
IDE (Integrated Development Environment) 270
Ideate 35
img element 97
index.html 104, 123, 124, 131, 134, 146, 149, 164
IndexedDB 245
Information architecture 35
inline elements 89
Inline Styles 107
Input elements 98
Internal Style Sheets 107
International Organization for Standardization (ISO) 79
internationalization i18n 149
Internet Engineering Task Force (IETF) 79
Internet Explorer 269
Internet of Things (IoT) 11, 56
iPad 57
iPhone 57

J

Java 231
JavaScript 55, 80, 118
jQuery icons 73
jQuery Mobile 66
jQuery mobile buttons and toolbars 71
jQuery mobile navigation bar 75
jQuery mobile transitions 74
JSON 128, 201, 216, 234
Juice jacking 250

K

Key-value stores 230
Kindle Fire 57
KPIs 122

L

Latency 25
latency hotspots 26
letterbox 164
lifecycle hooks 130
line chart 191
Load test 258
loyalty customers 46

M

machine learning 23, 26
Mainentry
  section tag 100
mangoDB 230
manifest file 264
manifest.json 133, 146, 152, 154, 167, 244
map element 98
Meta tags 85
metadata 202
Microsoft Excel 28
Microsoft Internet Explorer 53
Microsoft SQL 227
Mindmapping 35
minification 268
mitigation strategy 253
mobile revolution 19
mobile strategy 29, 30, 183, 248
mobile websites 20
Mobility 25
Mockups 37
Model View Controller (MVC) 62, 127
Modular programming 127
MySQL 227

N

namespaces 133
native apps 62
Native apps 247
natural language processing 274
nav tag 101
navigation 165
navTo() 178
Netbeans 271
new elements in HTML5 100
Node.js 232
Nokia 20
Northwind 242
NoSQL 16, 23, 227, 229

O

OData 76, 128, 152, 240, 244
OData model 128
Oil and gas 48
onAfterRendering 205
OpenUI5 SDK 81, 117, 120
optimization 259, 267, 270
Oracle 227
ordered lists 93
OWASP 253

P

Paragraphs 88
penetration rate 20
phishing 249
PhoneGap 55
PHP 231
phpMyAdmin 235
pie chart 191
Pixels 56
Plotly.js 200
PostgreSQL 227
Power BI 273
PPI 56
predictive analytics 26
Preformatted text 89
Presentation layer 80
privacy 254
product distribution 216
Project de Novo 38, 165
Project Halo 49

Project Nimbus 44
Project Phoenix 41
Project Prism 46, 122, 234, 270
Prototype 35
pseudo-classes 111
pseudo-elements 111
Python 231

R

ransomware 250
Rapid application development (RAD) 60
Real time BI 25
real-time information 24
relational databases 227
renderer 202
RESTful APIs 240
Retail 43
routing 165, 167
routing API 165
Ruby on Rails 233

S

Samsung Galaxy 57
sandboxing 252
SAP Web IDE 118
sap.app 154
sap.m 122, 133, 138, 153, 174, 175, 208
sap.m.GenericTile 181
sap.m.routing.Router 168
sap.m.Shell 163
sap.m.text() 124
sap.ui 154
sap.ui.getCore() 122
sap.ui5 154
sap_belize 122
sap_bluecrystal 161
SAPUI5 77
SARToolKit 275
Scatter charts 193
Screen resolution 56
Screen size 58
screen size breakpoint 57
Security 16, 31, 247, 248, 258
server-side scripting languages 230
Simulators 259
Sitemaps 37
Smartphone 21
smudge attack 249
span element 90
split-screen 184
SSL encryptions 258
Stacked charts 190
StandardTile 139
Storyboards 37
Stress test 258
Structural layer 80
structured query language (SQL) 227
Style sheets 106
SuccessFactors 241
SVG 205
SVG element 91

T

table schema 228
table tag 100
Tableau 12, 13, 241, 273
Telecommunications 38
test 257
Test 35
Text elements 86
tokenization 252

top-down information architecture 36
Two-way binding 131

U

unique subscribers 20
Unordered lists 92
Use case scenarios 37
user-friendliness 258

V

value-time curve 25
video tag 102
virtual reality 274
virus 249
Visual Studio Code 271

W

waterfall model 60
Wearables 56
web apps 62
Web development layers 80
Web standards 79
WebStorm 271
white box testing 253
wide-column 230
Wi-Fi 249
World Wide Web Consortium (W3C) 53, 79

X

XAMPP 119, 234
XML model 129
XML view 129
XSS 251