Future of Computer Engineering

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Professional Background

- Education
  - Austrian High School, Istanbul (1985)
  - B.S. Computer Engineering, Boğaziçi University, Istanbul (1989)
  - M.S. Computer Science, Indiana University, Bloomington (1991)
  - Ph.D. Candidate Computer Science, Indiana University (1993)
  - Minor in Mathematics, Indiana University, Bloomington (1993)
- Career
  - Associate Instructor @ Indiana University Computer Science (1989)
  - Research Assistant @ IU Formal Methods Lab (1991)
  - Sr. Research Staff @ Derivation Systems, Inc. Carlsbad, CA (1995)
  - VP of Engineering @ Derivation Systems, Inc. Carlsbad, CA (2001)
  - Software Development Engineer @ Microsoft Corp, Redmond, WA (2005)
  - BI Development Team Manager @ Turkcell Teknoloji, Gebze (2008)
  - Mobile Internet Infrastructure Development Manager @ TTECH (2009)
  - Research Manager @ Turkcell Teknoloji (2011)
  - Current: Research & Development Governance @ Turkcell (2014)

Looking Back 30 Years

- Computer Graphics
- Operating Systems
- VLSI
- Formal Methods (FM9001)
- Hardware Derivation & Compilation
- HW Circuit & PCB Design
- Compilers (C#)
- Developer Tools
- Business Intelligence
- Mobile SW Platforms
- Big Data, Cloud & Analytics
- Mobile Anything

Future of Computing

- Mobile = Anytime + Anywhere
- Mobile Computing
- Mobile Learning
- Programming Languages
- Cloud Computing
- Big Data via Smart Applications
- Data Science & Analytics

Mobile Computing

- 50 Billion connected devices by 2020!

- Desktops, laptops, tablets, smartphones, M2M devices, wearables, cars, cows, anything you can think of!
- All the web on & off line, 24x7.
- Yes, we will be **too** connected!

- Mobile computing requires
  - Low energy
  - Resource Efficiency
  - High Connectivity

Trends in Mobile Computing

- **Mobile App Developers Are Popular:** As businesses find new ways to harness mobility in 2013, the demands for specialized apps and support will only increase.
- **HTML5 comes on board:** Android and iOs have the market for the moment, but developers are also interested in HTML5
- **Consumerization:** BYOD is here to stay….and Consumerization leads to other related BYOs (personal cloud, app stores, Windows 8, etc.)
- **Mobile Device Management:** Growth in BYOD programs will lead to increased popularity of MDM solutions and services
- **Mobile Collaboration:** Social Business trend drives need for new mobile collaboration capability
- **Video Streaming:** Live and recorded videos embedded into mobile business processes
- **Mobile Assistants:** Workers demand enterprise versions of Watson/Siri for mobile search and productivity apps
- **Mobile Analytics and Visualization Apps:** New analytical and visualization solutions will be developed and deployed for remote and mobile workers.
- **Mobile Clouds:** Enterprises will develop and deploy mobile clouds for specific apps
- **Mobile Payments:** Employee expenses paid via mobile. Business accepting payments for products solutions and services via mobile
- **Increased Need for Speed:** Big data, analytics, social, and mobile video will drive demand for faster mobile networks

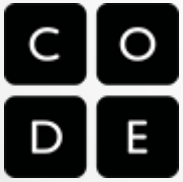
Mobile Learning

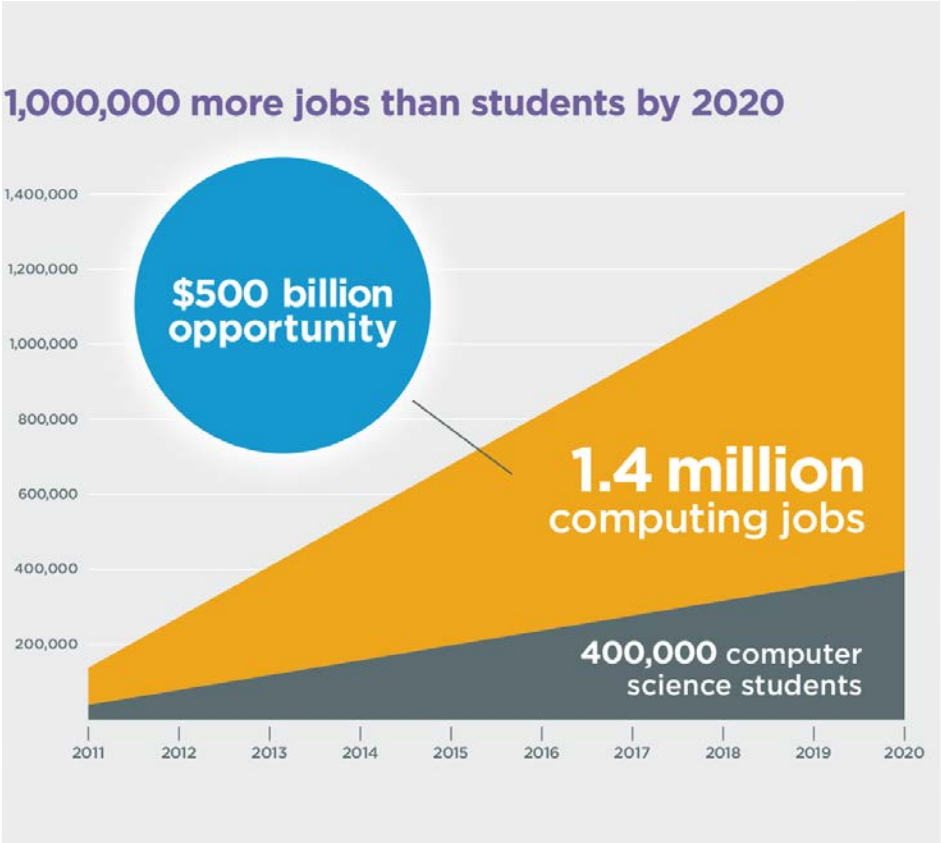
- Many avenues for online learning offered by
  - Universities
  - Corporations
  - Organizations
- Examples:
  - Khan Academy
  - Udacity
  - Coursera
  - edX
  - Codecademy
  - CodeSchool
  - LearnStreet

Programming Languages

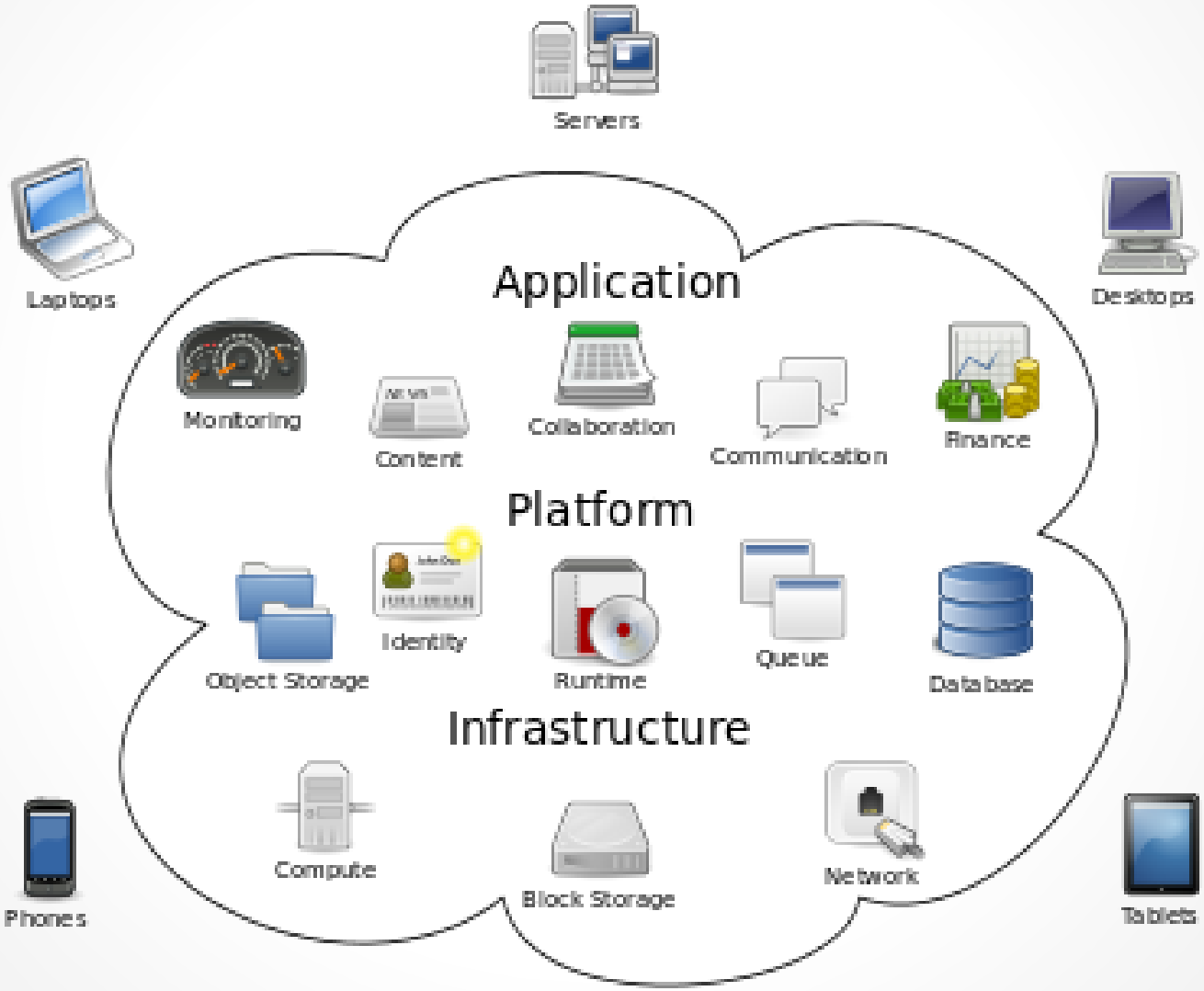
- Need for *NEW* user-friendly, expressive, performant languages!
- Must have the right tool for the job!

- C#
- F#
- Python
- Ruby
- Scala





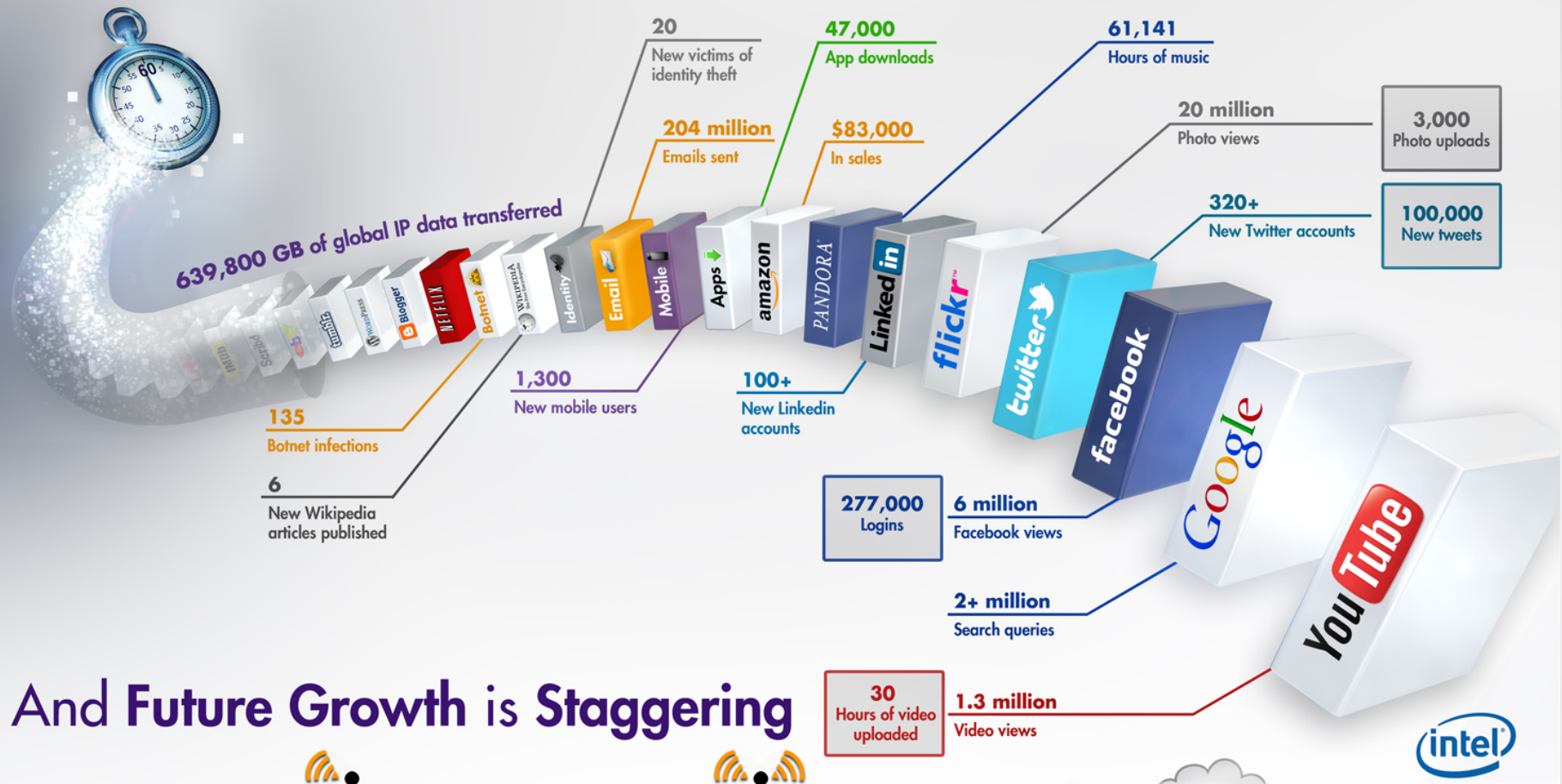
Cloud Computing



Big Data

- Big data needs **processing**
  - NoSQL/Non-relational databases/NEWsql
  - MapReduce, Hadoop, etc.
- Big data needs **analyzing**
  - Data mining & analytics
  - Data Science is a major!
  - Data Scientist is a job!
- Big data needs **intelligence**
  - Machine Learning
- Big data feeds itself **through the cloud**
  - More applications to consume & produce data
  - New business models: crowd sourcing, micro services, API markets.

What Happens in an **Internet Minute?**



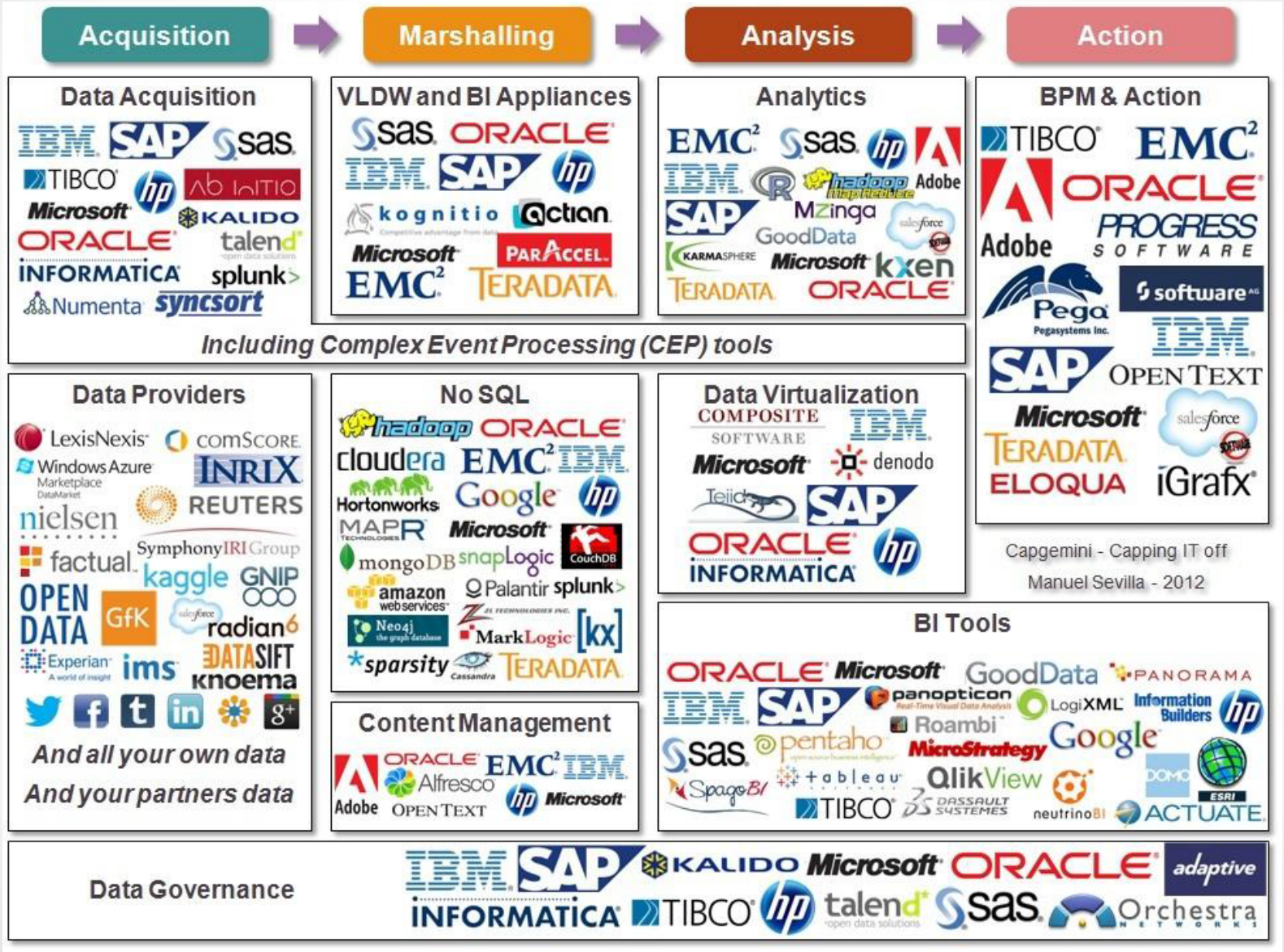
And **Future Growth** is **Staggering**

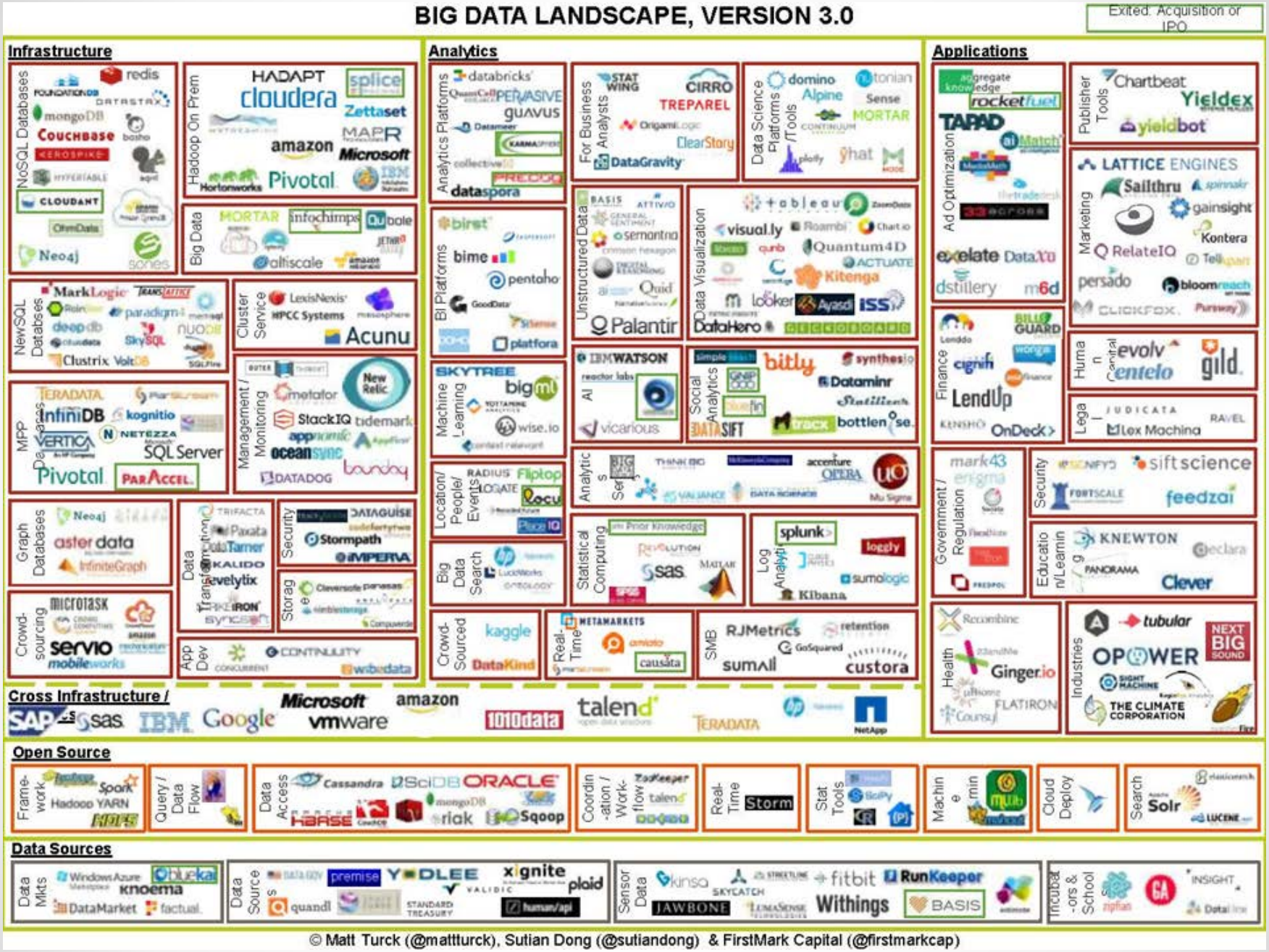
Today, the number of networked devices = the global population

By **2015**, the number of networked devices = **2x** the global population

In **2015**, it would take you **5 years** to view all video crossing IP networks each **second**

Big Data Landscape (2012)




BIG DATA LANDSCAPE, VERSION 3.0
Exited: Acquisition or IPO
Infrastructure
NoSQL Databases
redis
FOUNDATIONDB
DATASTAX
mongoDB
Couchbase
basho
KEROSPIKE
HYPERTABLE
aerospike
CLOUDANT
OrientDB
Neo4j
scalien
Hadoop On Prem
HADAPT
cloudera
splice
Zettaset
MAPR
amazon
Microsoft
Hortonworks
Pivotal
IBM
Big Data
MORTAR
infochimps
Qubole
JETNET
altiscale
amazon web services
NewSQL Databases
MarkLogic
TRANSLATTICE
Rainstor
paradigm4
memsql
deepdb
cloudata
SkySQL
NUODB
Clustrix
VoltDB
SQLFire
Cluster Service
LexisNexis
HPCC Systems
mesosphere
Acunu
MPP Databases
TERADATA
ParAccel
InfiniDB
kognitio
VERTICA
NETEZZA
SQL Server
Pivotal
ParAccel
Management / Monitoring
New Relic
metafor
StackIQ
tidemark
appnomic
AppFirst
oceansync
boundary
DATADOG
Graph Databases
Neo4j
aster data
InfiniteGraph
Data Transformation
TRIFACTA
Paxata
DataTamer
KALIDO
Pervasive
Syncsort
Security
DATAGUISE
codefortytwo
Stormpath
IMPERVA
Storage
Cleversafe
Panasas
Crowd-sourcing
microtask
servio
mobileworks
App Dev
CONCURRENT
CONTINUITY
wibidata
Analytics
Analytics Platforms
databricks
QuantCell
PERVASIVE
guavus
Datameer
KARMASPHERE
collective[i]
PREDOOP
dataspora
BI Platforms
birst
bime
pentaho
GoodData
SiSense
platfora
Machine Learning
SKYTREE
big ml
YOTTAMINE
wise.io
Location/ People/ Events
RADIUS
Fliptop
LOGATE
Locu
PlaceIQ
Big Data Search
LucidWorks
Crowd-Sourced
kaggle
DataKind
Real-Time
METAMARKETS
amobee
causata
For Business Analysts
STATWING
CIRRO
TREPAREL
Origami Logic
ClearStory
DataGravity
Unstructured Data
BASIS
ATTIVIO
GENERAL SENTIMENT
semantria
Crimson Hexagon
DIGITAL REASONING
Quid
Palantir
Data Visualization
tableau
ZoomData
visual.ly
Roambi
Chart.io
qlik
Quantum4D
ACTUATE
Kitenga
Looker
Ayasdi
ISS
DataHero
Social Analytics
IBM WATSON
reactor labs
AI
vicarious
bitly
synthesio
Dataminr
Sysomos
GNIP
DATASIFT
Analytic Services
THINKBIG
accenture
OPERA
Mu Sigma
VALIANCE
DATA SCIENCE
Statistical Computing
Prior Knowledge
REVOLUTION
SAS
MATLAB
Log Analytics
splunk>
loggly
sumologic
Kibana
Data Science Platforms /Tools
domino
Alpine
tonian
Sense
MORTAR
CONTINUUM
ploffy
yhat
Applications
Ad Optimization
aggregate knowledge
rocketfuel
TAPAD
[x+1]
MediaMath
the trade desk
AppNexus
dstillery
m6d
Publisher Tools
Chartbeat
Yieldex
yieldbot
Marketing
LATTICE ENGINES
Sailthru
sparkpost
gainsight
Kontera
RelateIQ
Telligent
persado
bloomreach
CLICKFOX
Pursway
Finance
Lendio
BILL GUARD
cignifi
wonga
LendUp
KLNSHO
OnDeck
Human Capital
evolv
gild
entelo
Legal
JUDICATA
RAVEL
Lex Machina
Government / Regulation
mark43
enigma
Security
SIFTSCIENCE
FORTSCALE
feedzai
Education / Learning
KNEWTON
declara
PANORAMA
Clever
Health
Recombine
23andMe
Ginger.io
FLATIRON
Counsyl
Industries
tubular
NEXT BIG SOUND
OPOWER
SIGHT MACHINE
THE CLIMATE CORPORATION
Cross Infrastructure /
SAP
sas
IBM
Google
Microsoft
vmware
amazon
10gen
talend
TERADATA
NetApp
Open Source
Framework
Spark
Hadoop YARN
HDFS
Query / Data Flow
Data Access
Cassandra
SciDB
ORACLE
HBASE
mongoDB
riak
Sqoop
Coordination / Workflow
ZooKeeper
talend
Real-Time
Storm
Stat Tools
SciPy
R
Machine
MLlib
Cloud Deploy
Search
Solr
LUCENE
Data Sources
Data Mkts
Windows Azure Marketplace
Kaggle
knoema
DataMarket
factual
Data Sources
premise
YODLEE
xignite
VALIDIC
plaid
quandl
STANDARD TREASURY
Sensor Data
kinsa
SKYCATCH
fitbit
RunKeeper
JAWBONE
LUMOSITY
Withings
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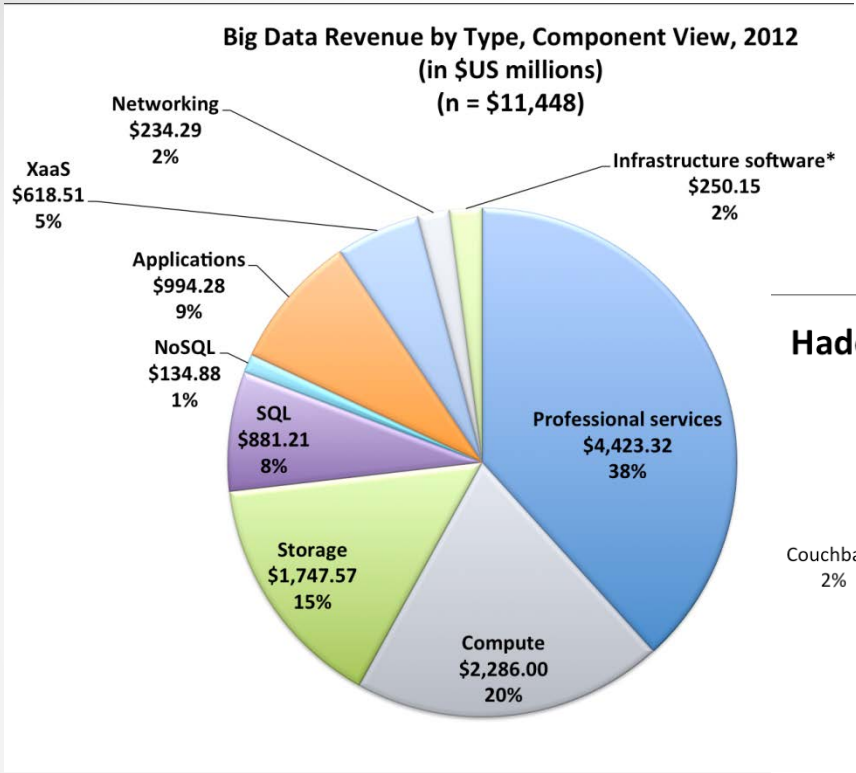
Big Data is Big Business



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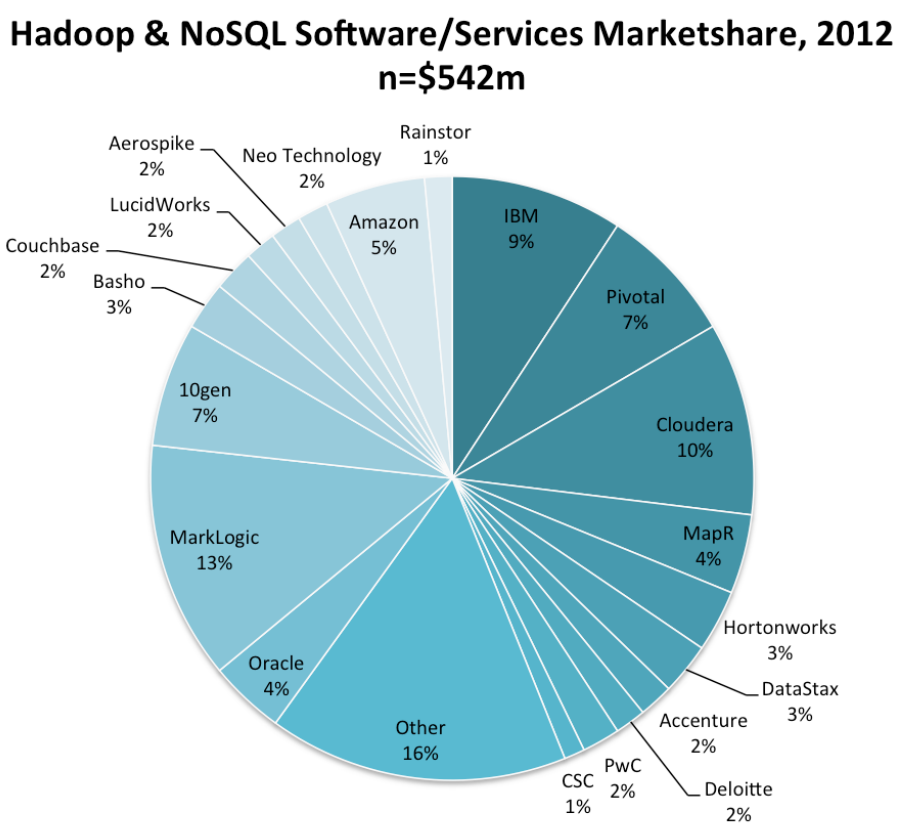

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Thank You