A little history . . .   Life in the Corporate "Data Center"

A little history . . .

- Things to think about:
  - Scaling, Lead time
  - Floor space
  - Power management
  - Heating/Cooling
  - Redundancy -- SPOF
  - Fire Suppression
  - Battery Backup -- UPS
  - Network Wiring
  - Data & Server Backups
  - Network Switching
  - 7X24 support
  - Alerts/Alarms

Welcome, "Cloud Computing"

– Private – my private cloud in my own data center

– Public – a shared environment hosted by a provider

A metaphor

- The electrical grid
  - You don't know where it comes from
  - It's there when you need it, just plug it in
  - Use what you want
  - Need more? Just take it.
  - Pay for what you use

Definition . . .

- **"Computing Services and Solutions are delivered and consumed in real time over the internet."**

- **Characteristics of Public Cloud Services**
  - Offsite hosting
  - Pay per use (setup/initial, plus ongoing)
  - Shared space
  - Massively Scalable
  - On-Demand Provisioning
  - Rapid Deployment
  - Lowers innovation barriers
  - Leading edge architecture

Advantages of Cloud Computing

- Ubiquitous (available from anywhere)
- Automated change management
- Massively Scalable
- On-Demand Provisioning
- Rapid Deployment
- Lowers innovation barriers
- Leading edge architecture
- Lower Cost

Disadvantages of Cloud Computing

- Surrender Control
- Less Robust Monitoring
- Requires Large Network Pipe/Capacity
- Less Secure – multi-tenancy, DDOS

Private versus Public Cloud

- Private: Leverage the advantages, with few disadvantages
    - Massively Scalable
    - On-Demand Provisioning
    - Rapid Deployment
    - More secure
    - Better Monitoring
    - BUT → Still requires significant internal infrastructure

% Enterprise Workloads in Cloud

Non Cloud 23%

Public Cloud 32%

Private Cloud 45%
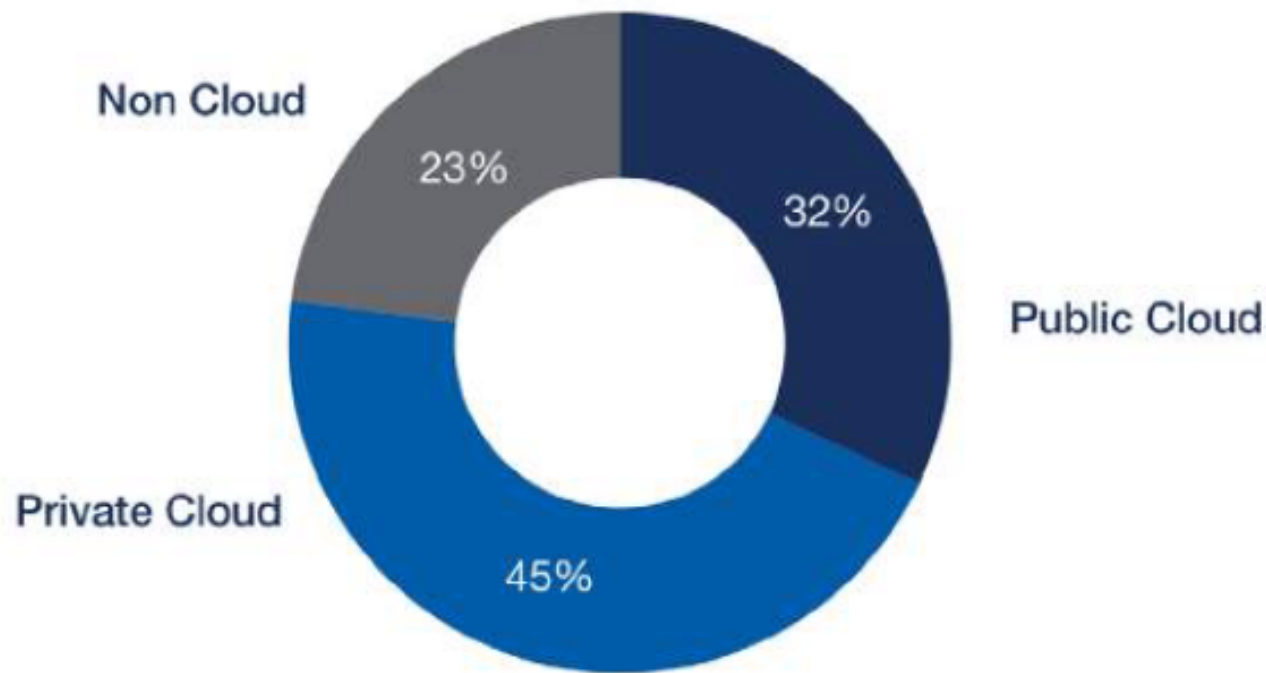
Source: RightScale 2018 State of the Cloud Report
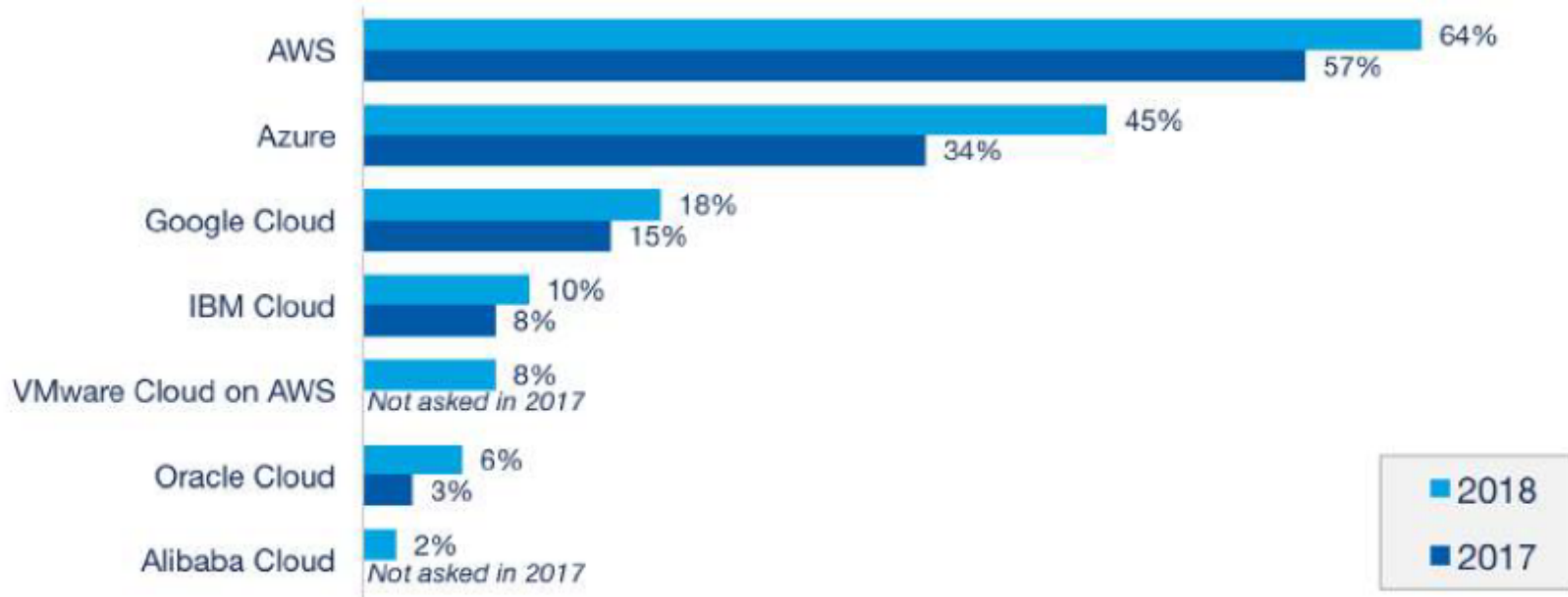
Worldwide Cloud IT Infrastructure Market Forecast by Deployment Type, 2016 - 2022 (shares based on Value)

Public Cloud Adoption 2018 vs. 2017
% of Respondents Running Applications

Source: RightScale 2018 State of the Cloud Report

Updates from Forbes/Gartner

Amazon Web Services (AWS) accounted for 55% of the company's operating profit in Q2, 2018, despite contributing only 12% to the company's net sales.

Enterprise adoption of Microsoft Azure increased significantly from 43% to 58% attaining a 35% CAGR while AWS adoption increased from 59% to 68%.

The enterprise SaaS market is now generating $20B in quarterly revenues for software vendors, a number that is growing by 32% per year.

Updates from Forbes/Gartner

- Public cloud services spending will grow nearly seven times faster than global IT spending.

- Annual market revenue will grow at a 24.4% CAGR (compound annual growth rate) worldwide for the period 2015-2020 to total $203.4 billion.

- Spending on software-as-a-service (SaaS), the predominant form of cloud computing, will lead the way. SaaS (software-as-a-service) spending will represent nearly two-thirds of global public cloud services spending this year and around 60% in 2020

- IaaS will grow at a five-year CAGR of 30.1%.

- PaaS will post a five-year CAGR of 32.2%.

Amazon's AWS – Leading Cloud Provider

- Amazon's North America e-commerce business delivered fourth quarter 2017 operating income of $1.69 billion on revenue of $37.3 billion.

- AWS had operating income of $1.35 billion for the fourth quarter 2017 with sales of $5.11 billion.

Cloud Business Drives Amazon's Profits

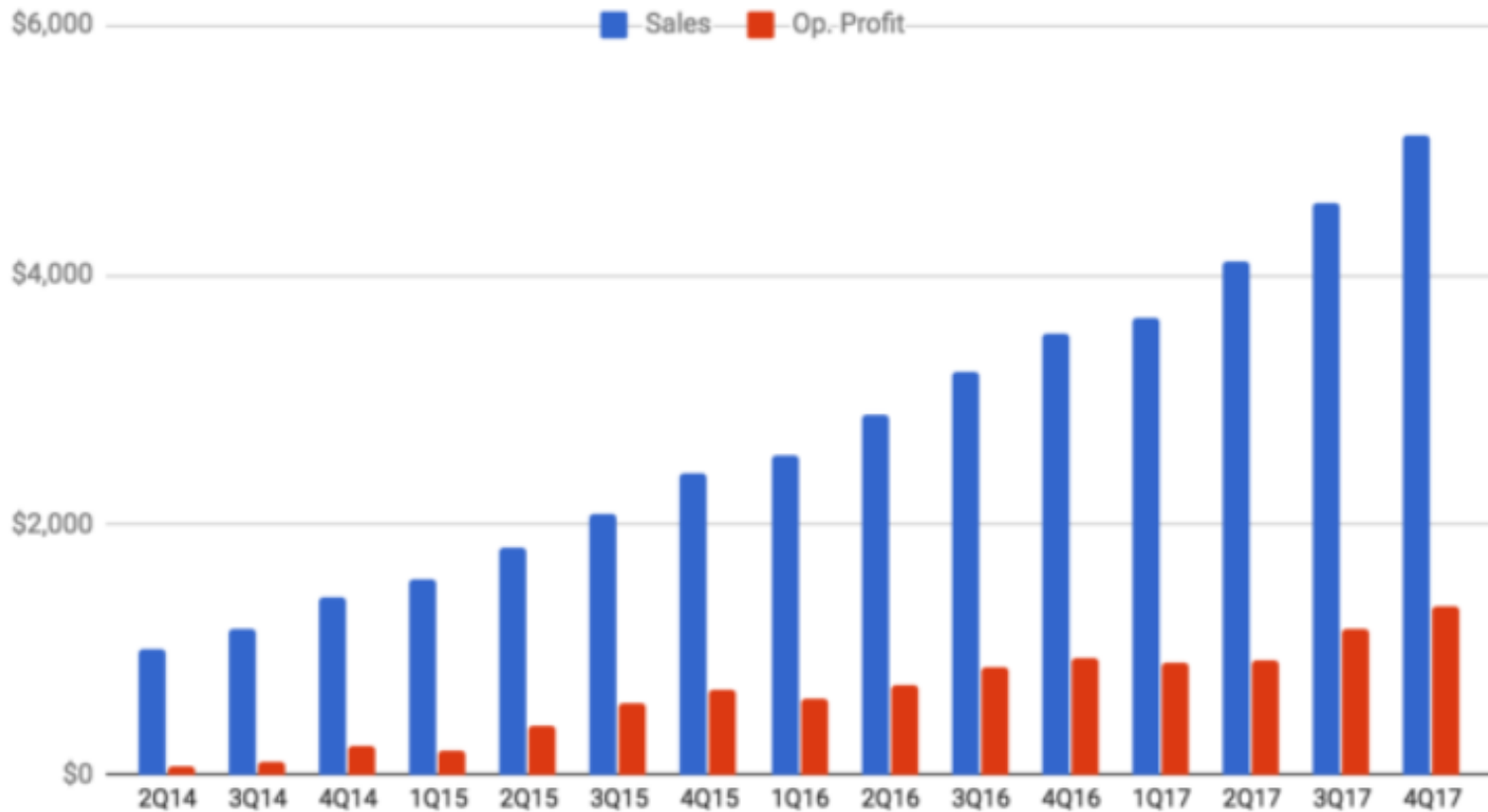Amazon's quarterly operating profit (in million U.S. dollars)

Amazon Web Services / Total

In Q2 2018, AWS accounted for...

12% of Amazon's consolidated revenue

55% of consolidated operating income

@StatistaCharts   Source: Amazon

statista

SOURCE: CLOUD BUSINESS DRIVES AMAZON'S PROFITS, STATISTA, JULY 27, 2018

14

Amazon Web Services (in millions)

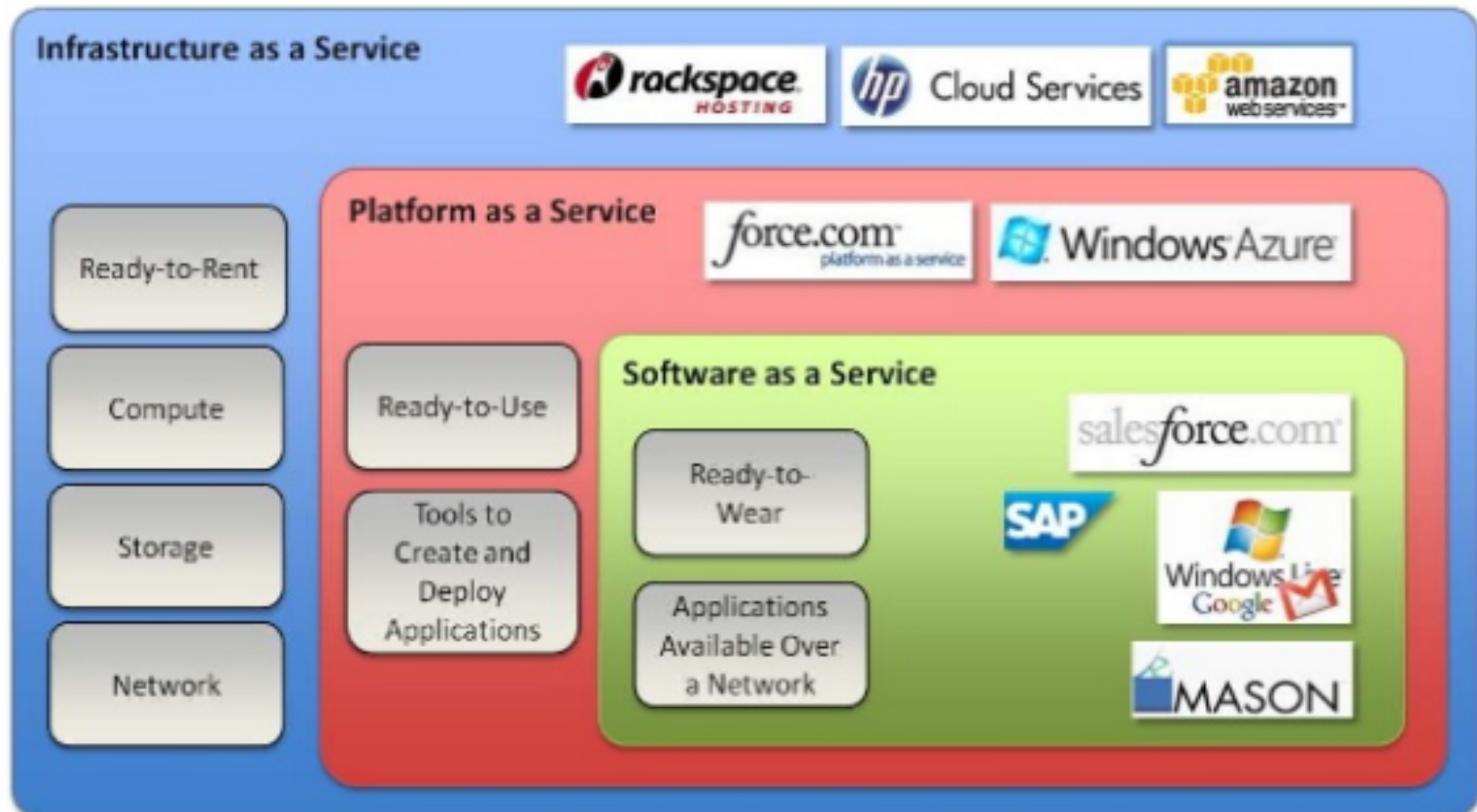(GeekWire Chart)

Amazon's AWS – Leading Cloud Provider

- For 2017, Amazon Web Services gave Amazon $5.11 billion in revenue, above analysts' estimates.

- While AWS leads the cloud market, Microsoft Azure's 98 percent revenue growth rate exceeded Amazon's 44.6 percent growth rate.

- If you purchased 20 shares of Amazon stock on November 1, 2017 at $1126.81 per share ($22,536.16), as of March 19, your investment would now be worth $30,880 (at $1,544 per share.) That is an 89% annual growth rate.
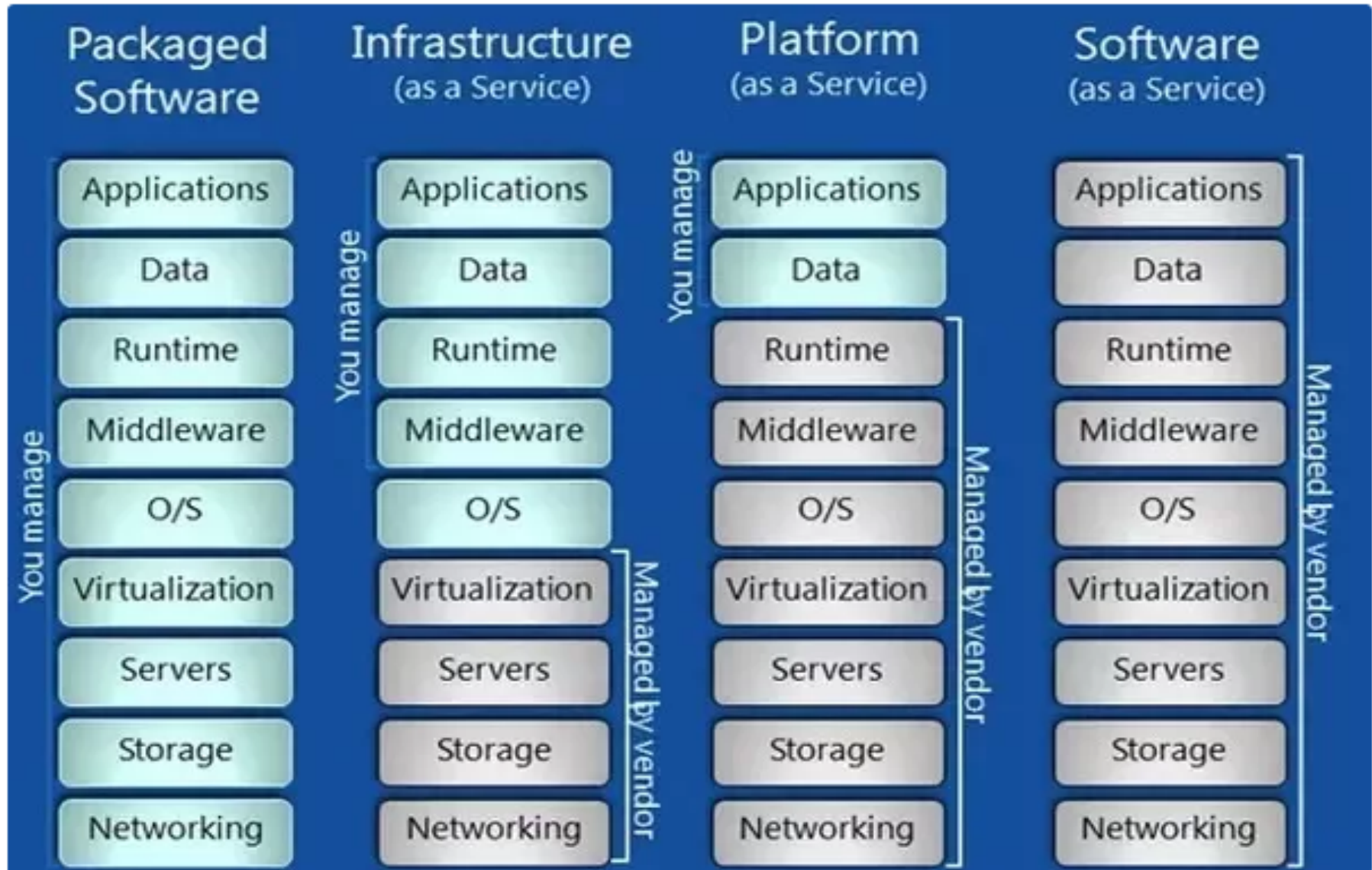
Cloud Computing

- **IaaS - Infrastructure-as-a-Service**
  - A cloud service providing infrastructure - computers, networking resources, storage. Typically virtual, but could be could be physical.

- **PaaS - Platform-as-a-Service**
  - A cloud service that hides the infrastructure (users don't see the servers, storage, switches, etc.) Provides a software development platform. Users can develop and run an application on a PaaS: the system ensures the app has the necessary infrastructure to run and scale.

- **SaaS - Software-as-a-Service**
  - A cloud service providing users access to software in a self-service, on-demand fashion. This could be a single application or an entire suite.

Fundamental Cloud Computing Services!

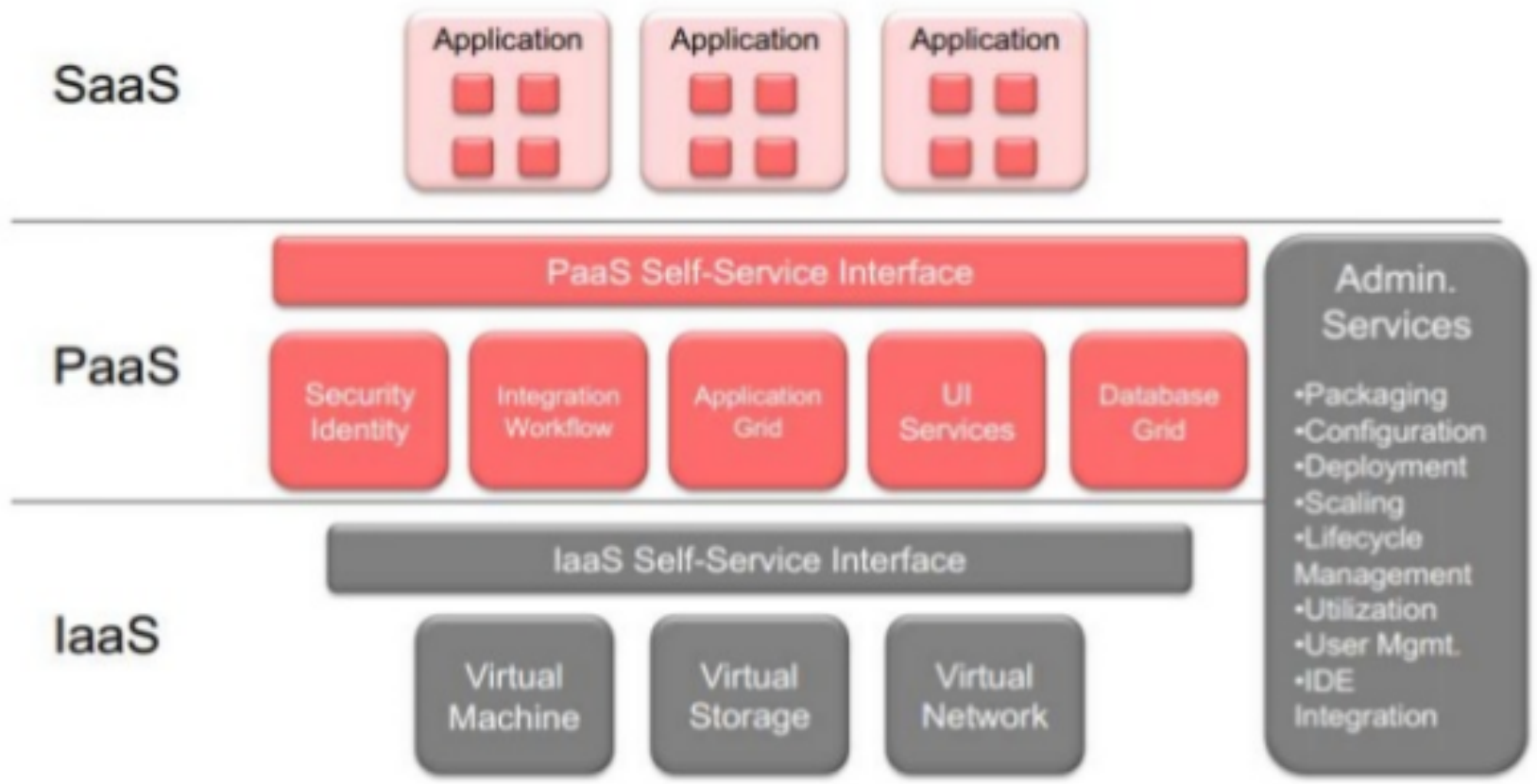**SaaS**
- Application
- Application
- Application

PaaS
- PaaS Self-Service Interface
- Security Identity
- Integration Workflow
- Application Grid
- UI Services
- Database Grid

IaaS
- IaaS Self-Service Interface
- Virtual Machine
- Virtual Storage
- Virtual Network

Admin. Services
- Packaging
- Configuration
- Deployment
- Scaling
- Lifecycle Management
- Utilization
- User Mgmt.
- IDE Integration

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- **Heroku**
  - One of the first PaaS providers out there (June 2007)
  - Initially focused on Ruby
  - Purchased by SalesForce in December 2010
  - Free on a small scale (great for students)
  - Many competitors
    - AWS, GoogleSites, Azure, OpenShift, DigitalOcean
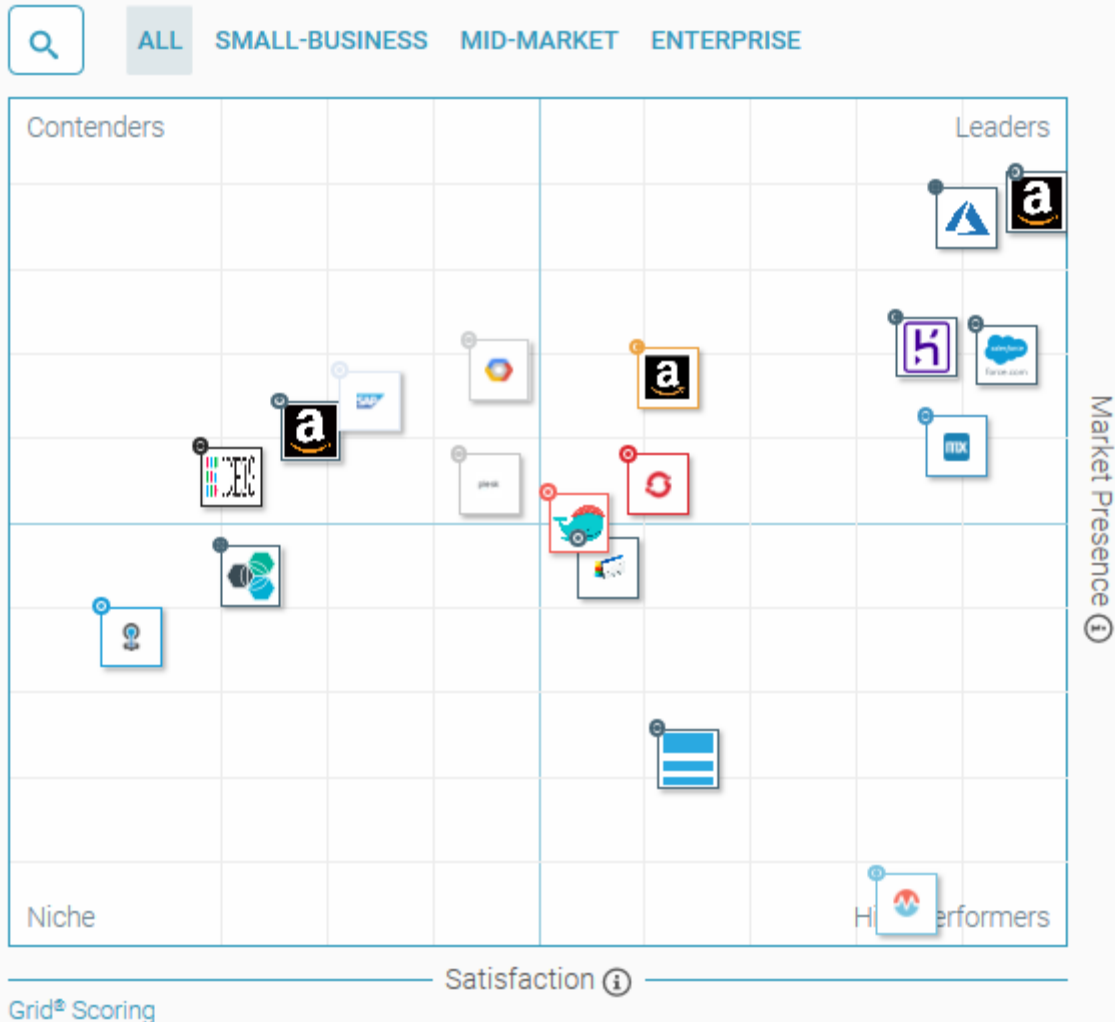
Everything you need to build, run, and scale customer apps

Dynos — Run virtually any language at scale

**Database** — Enterprise grade PostgreSQL as a Service
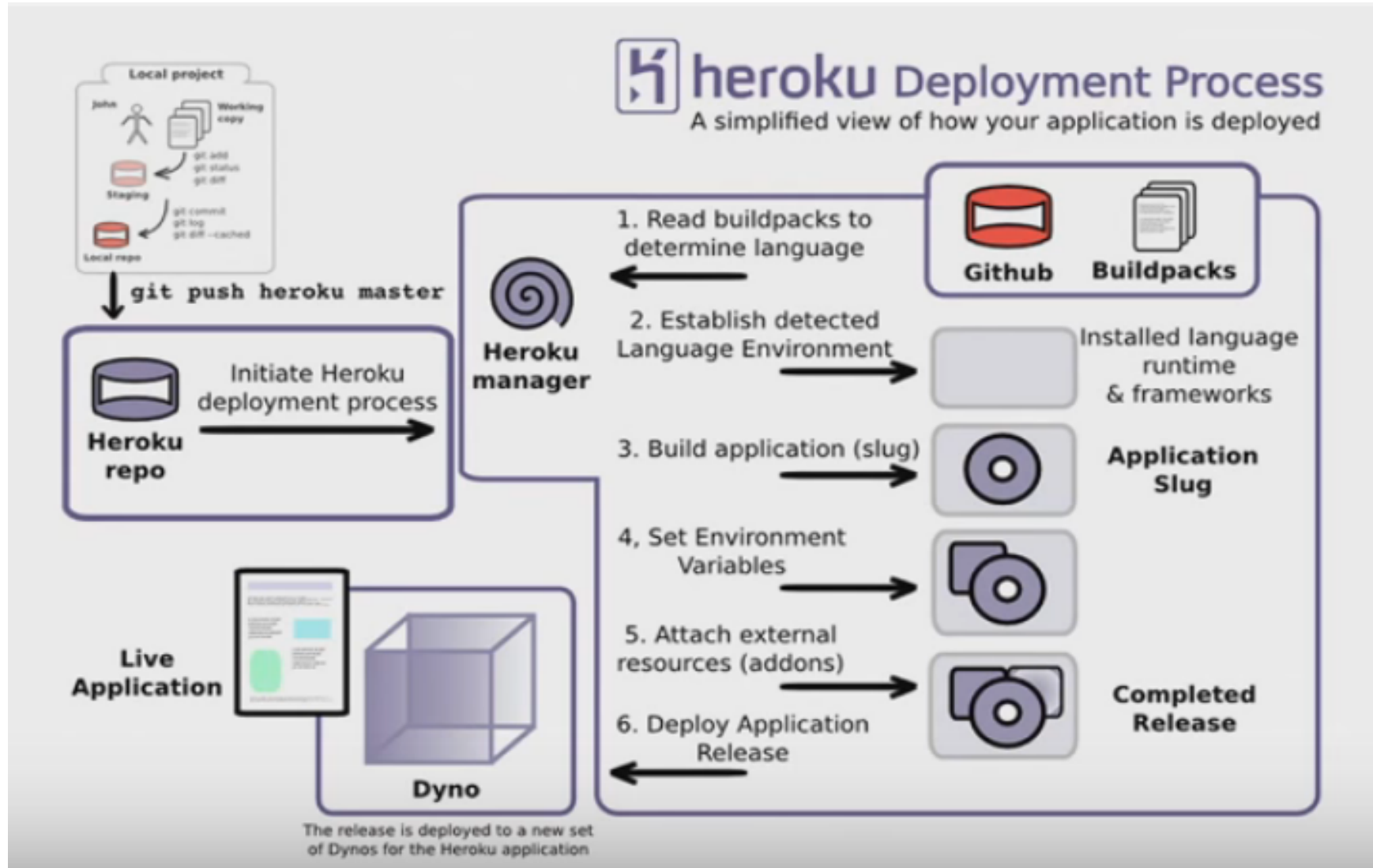
Add-ons — Marketplace for data stores and app services

- **Provides users with one or more DYNOs**
  - "Dyno" - a virtual engine that runs your app.
  - If you need to add capacity, you can add more dynos.

- **Provides Standard PostgreSQL database engine**

- **Allows "add-on's"**
  - Load testing
  - Email sending
  - Create a PDF
  - Alternate DB (MySQL, Mongo or Redis)

- **Core support for Ruby, Python, NodeJS, Java, PhP**

- **Tightly integrated with git for version control**
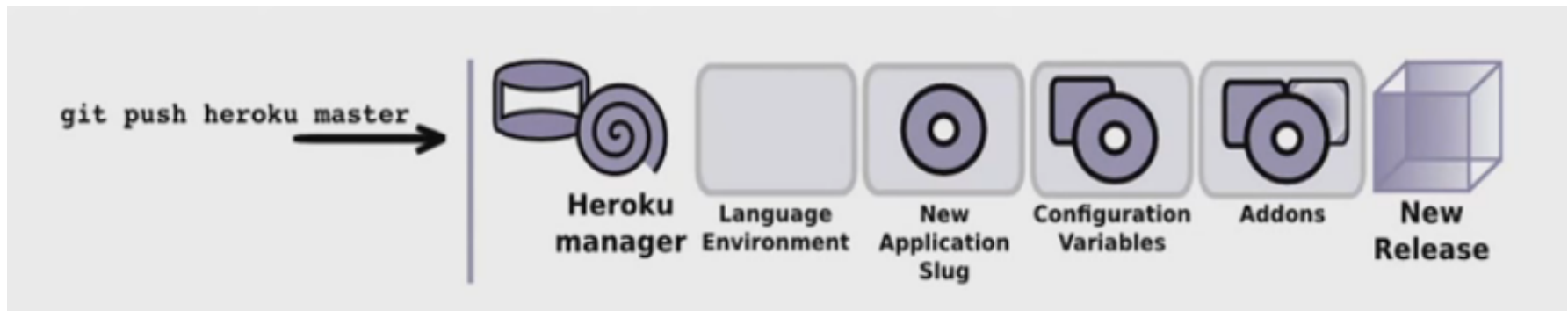
- **Write your app in any supported language**
- **Ready to deploy, push to heroku git master**
- **Heroku Manager**
  - Packages your app into an executable bundle
  - Contains all components needed to run your app
  - Compiled app is called a "slug"
  - Slug is executable on the DYNO
  - Compiled through a "buildpack"
  - Every change is a "new release" – easy to roll back

- **Learn More At**

https://devcenter.heroku.com/categories/reference

Heroku

Demo

- **Following this tutorial:**

  https://devcenter.heroku.com/articles/getting-started-with-nodejs#introduction