Volunteer Cloud Computing

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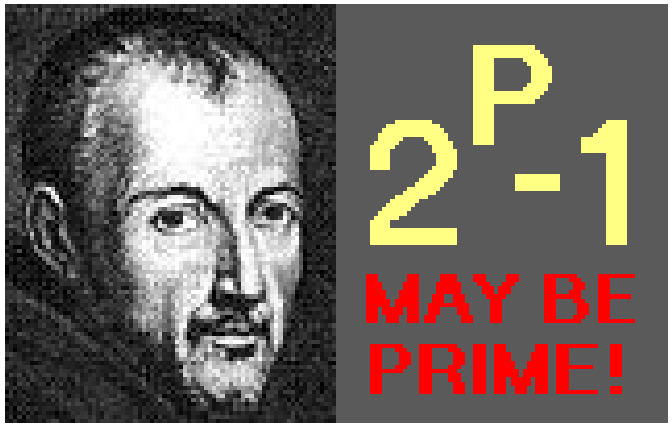
Agenda

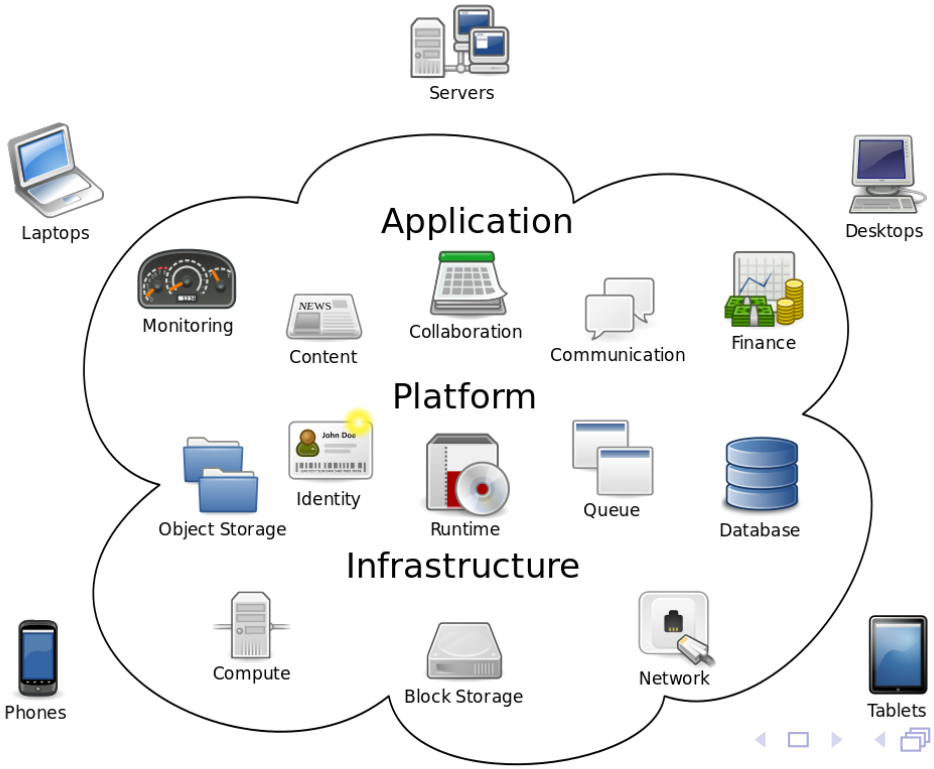
Volunteer Computing



- Great Internet Mersenne Prime Search [1996]
- Distributed Computing based on Collaboration
- ... throughput of 137.023 TeraFLOP/s

Cloud Computing

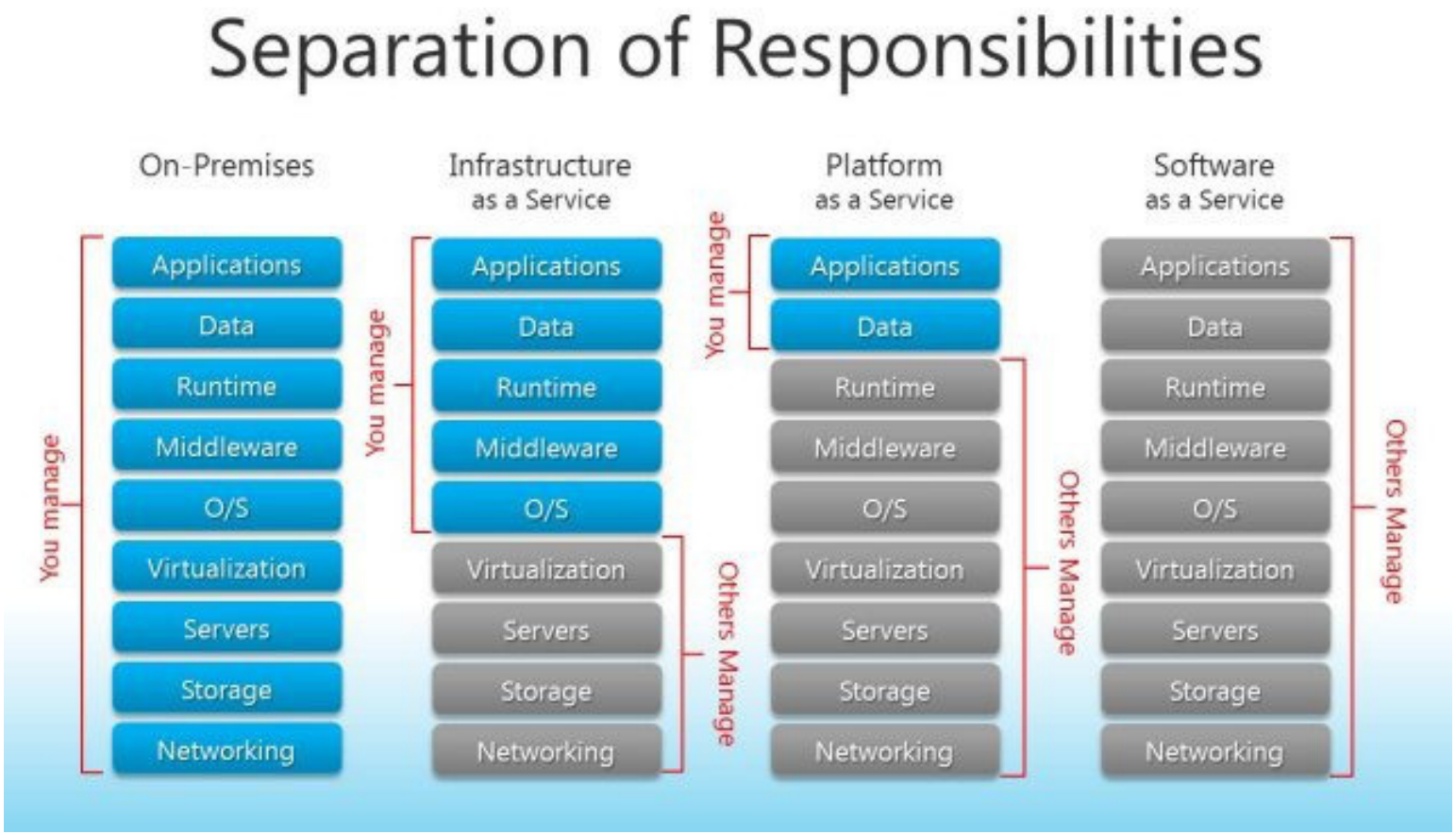
- Natural evolution of Web 2.0, SoA and Virtualization technologies.



Definition

NIST provided a description of the characteristics of a Cloud Computing infrastructure:

- On-demand Self-Service
- Broad Network Access
- Resource Pooling
- Rapid Elasticity
- Measured Services


Separation of Responsibilities
On-Premises
Infrastructure as a Service
Platform as a Service
Software as a Service
Applications
Data
Runtime
Middleware
O/S
Virtualization
Servers
Storage
Networking
You manage
Others Manage

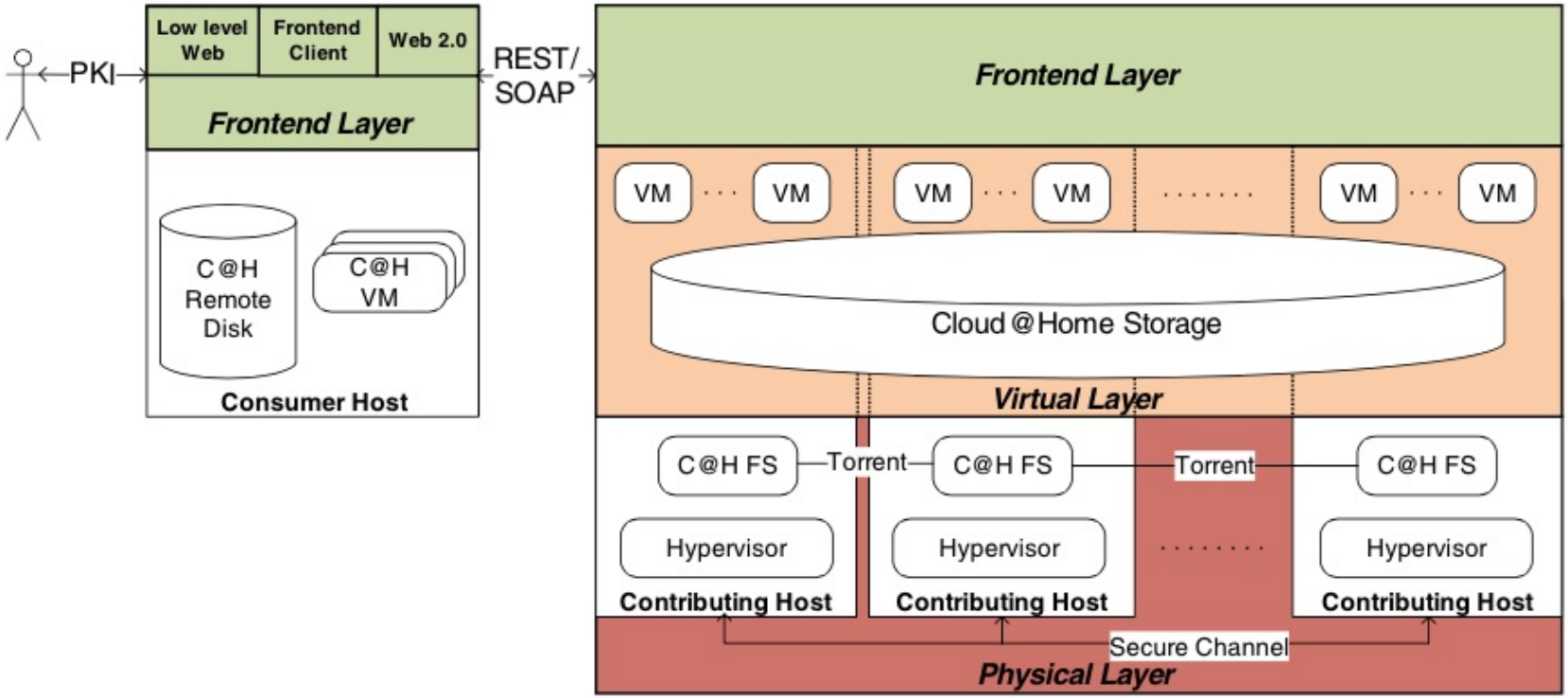
Volunteer Cloud Computing

- Volunteer + Cloud = Volunteer Cloud Computing

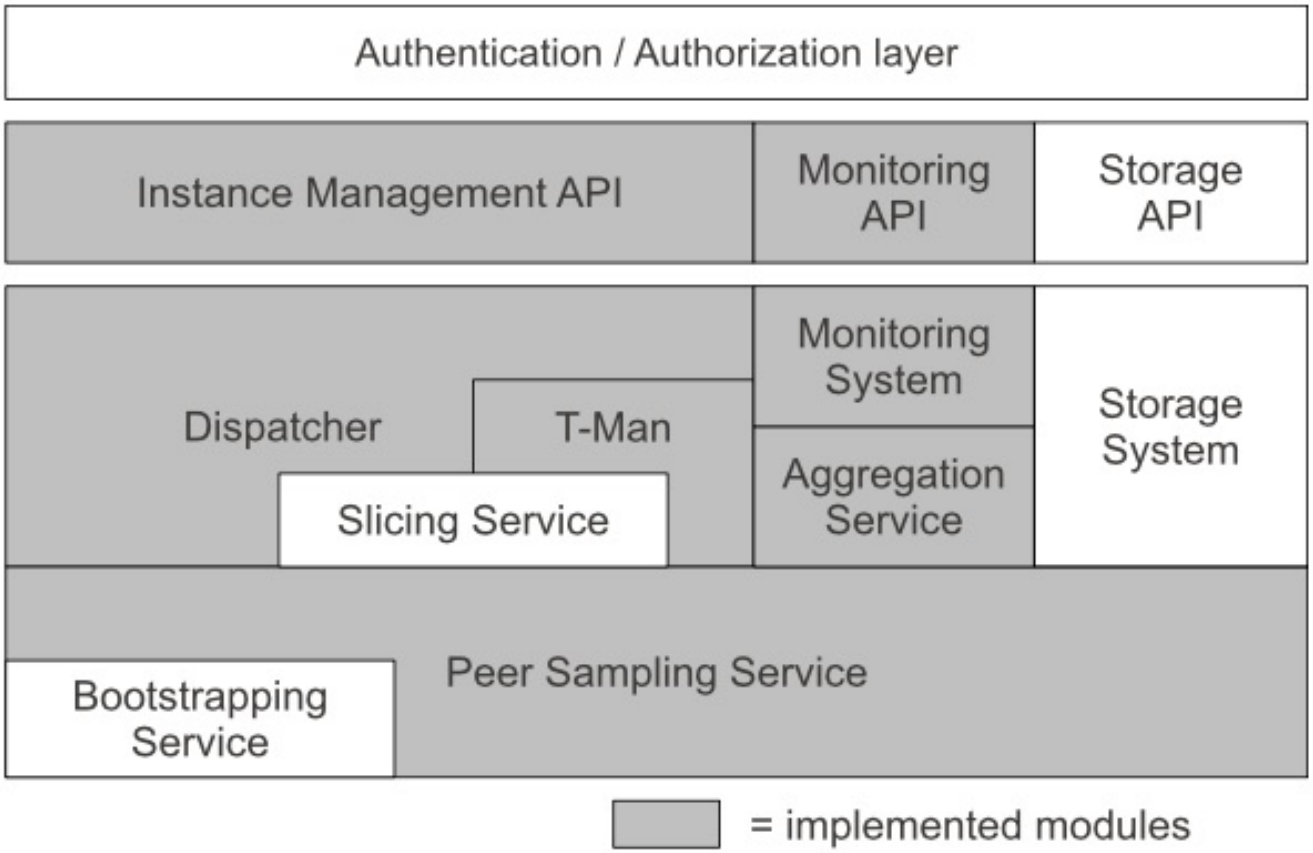
Related Work

- **Cloud@Home**[2009] and **Peer-2-Peer Cloud System**[2011]
- ... and a handful of conceptual reflections

Cloud@Home


PKI
Low level Web
Frontend Client
Web 2.0
Frontend Layer
C@H Remote Disk
C@H VM
Consumer Host
REST/ SOAP
Frontend Layer
VM
Cloud@Home Storage
Virtual Layer
C@H FS
Torrent
Hypervisor
Contributing Host
Secure Channel
Physical Layer

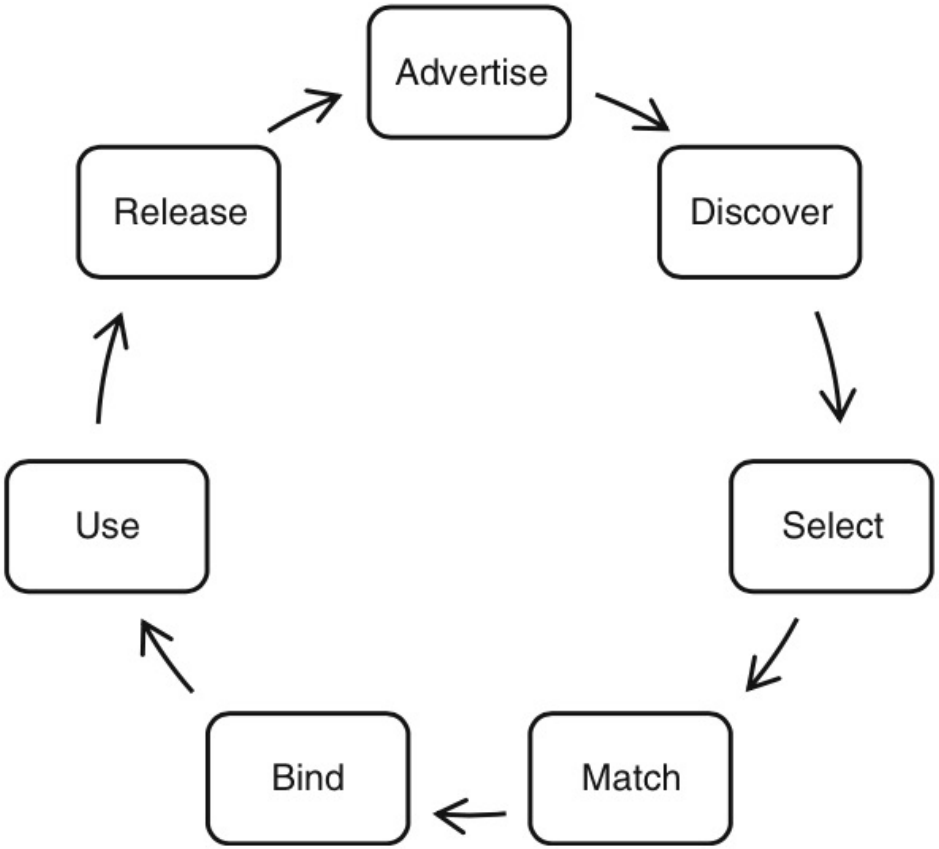
P2PCS


Authentication / Authorization layer
Instance Management API
Monitoring API
Storage API
Dispatcher
T-Man
Slicing Service
Monitoring System
Aggregation Service
Storage System
Peer Sampling Service
Bootstrapping Service
= implemented modules

Brief Analysis

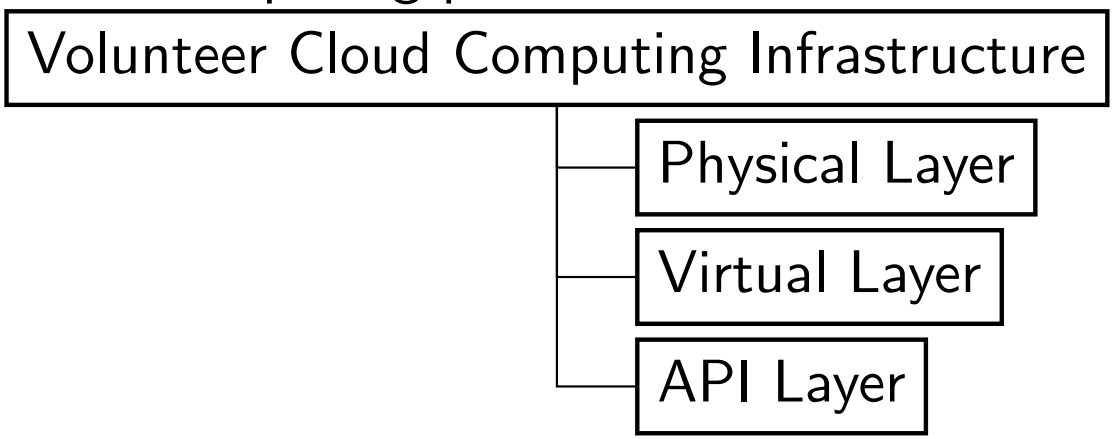
- **Scope**
- **Novelty** generally incurs under-specifications of the requirements!

Requirements

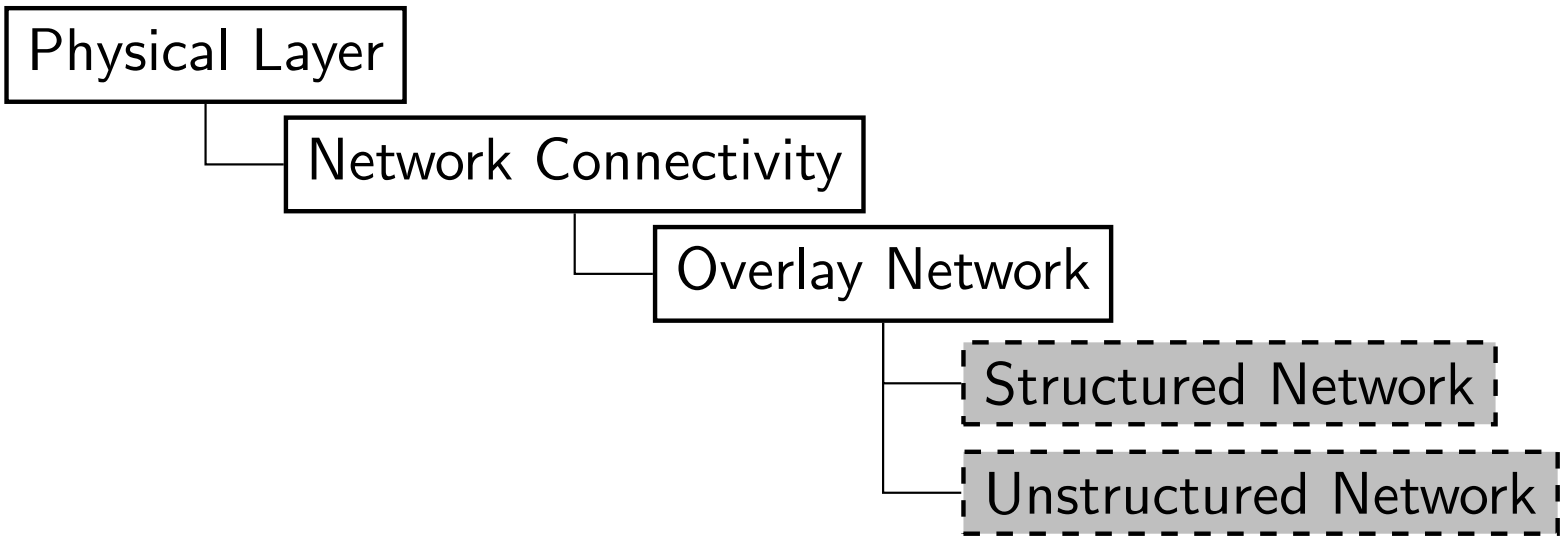


Infrastructure

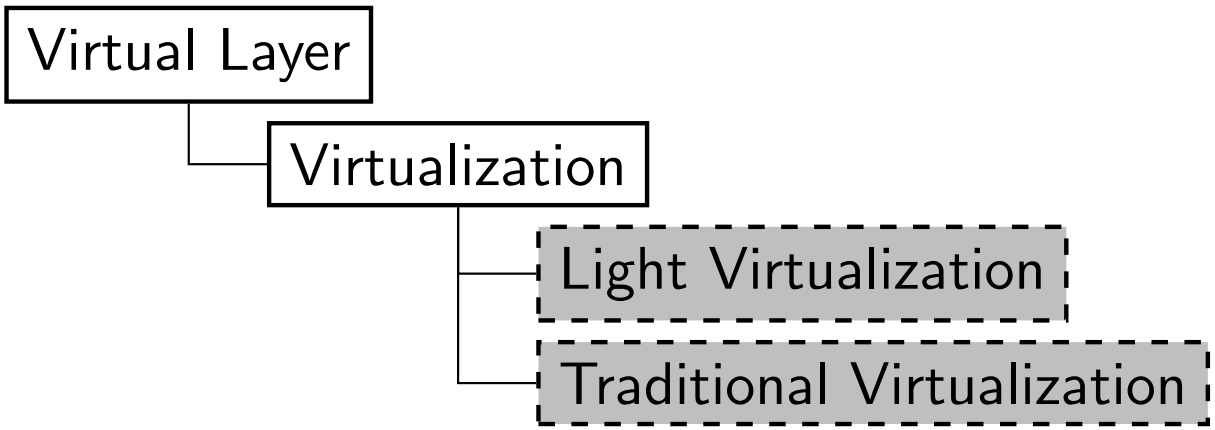
An Architecture for a fully de-centralized peer-to-peer volunteer cloud computing platform-as-a-service infrastructure.

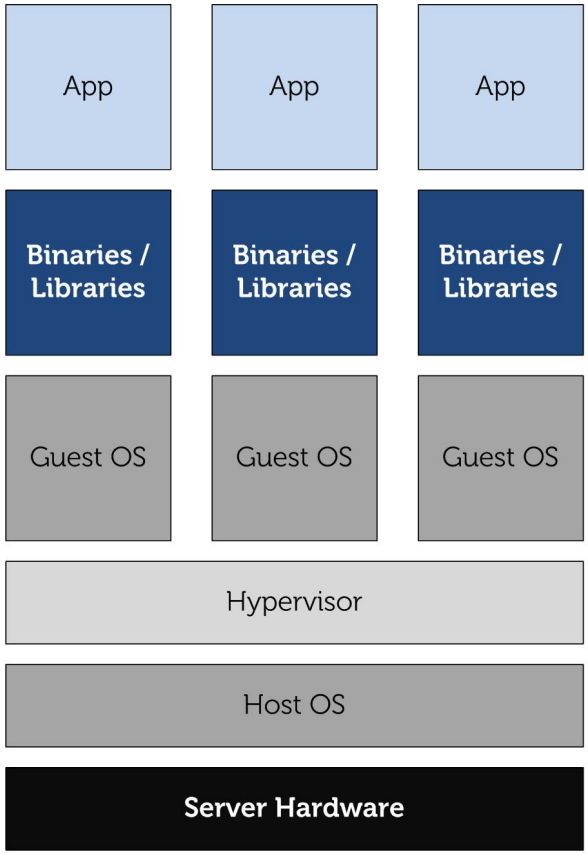


Physical Layer

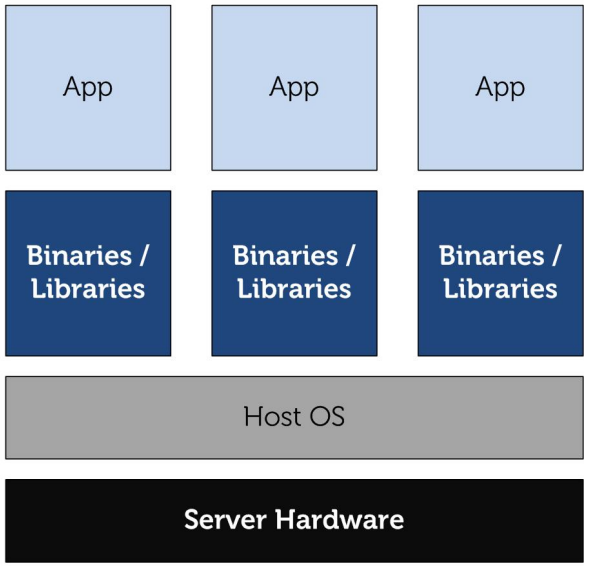


Virtual Layer



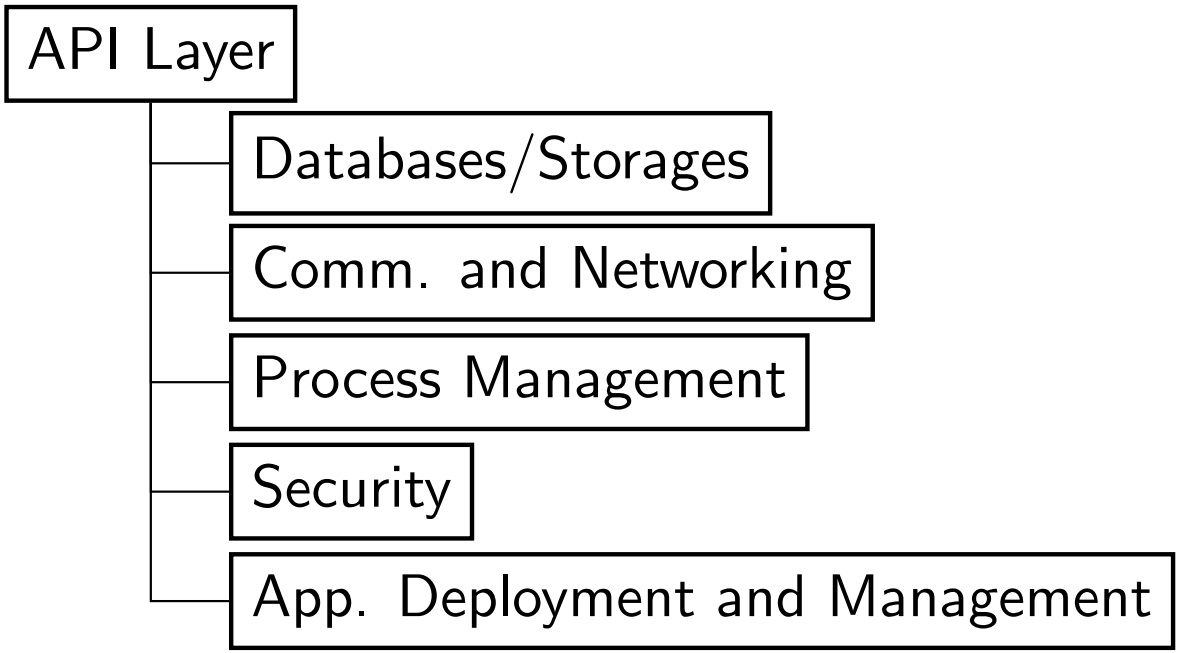


Virtualization



Containers

API Layer


API Layer
Databases/Storages
Comm. and Networking
Process Management
Security
App. Deployment and Management

- **Structured vs. Unstructured Networks** w.r.t. VCC (trade-off: Single-Attribute-Dominated Queries vs. Multi-Attribute-Dominated Queries).
- **Co-operative Web Hosting** how to host a web application using a peer-to-peer architecture.

- **Using Light Virtualization rather than Traditional (VMs) Virtualization**
- **API Barebone specification**
- **Proof of concept, (work in progress...)**
- **Fully de-centralized approach to VCC**

- Make the proof of concept closer to a production-ready prototype.
- Provide formal analysis of the F.T. and reliability of the system.
- Choose the most adequate solution (Physical Layer), rather than the most convenient.
- Work towards a more concrete ontological representation of VCC.

References here....