



Wendelin Exanalytics *Security & Safety Design*

2014-07-07 – Shanghai



Agenda



Architecture Overview

- **Design Goals**
- **Security**
- **Safety**

Wendelin Core

100% open source

100% Python

Numpy / OpenCV-Python / Scikit-learn / etc.

Data Analytics

NEO

Distributed Storage



ERP5

Elastic PaaS

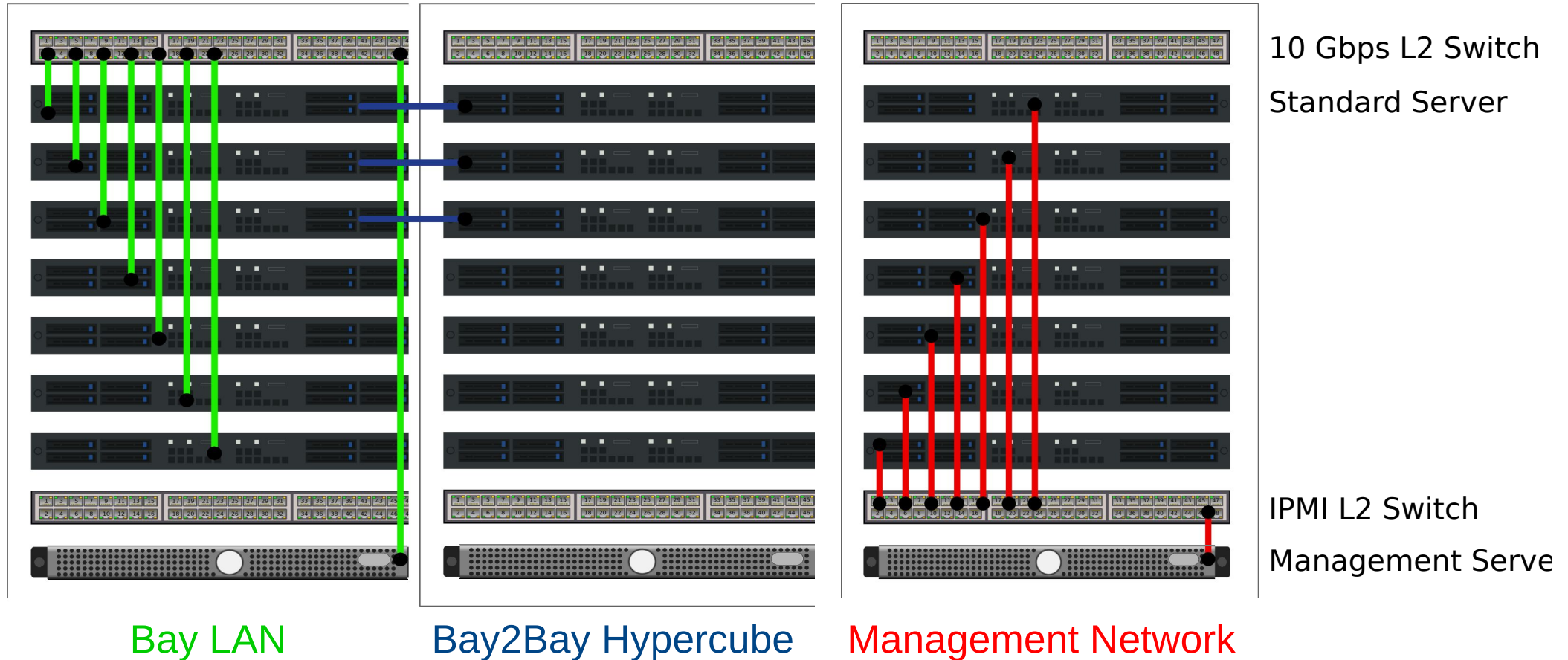
SlapOS

Multicloud Deployment

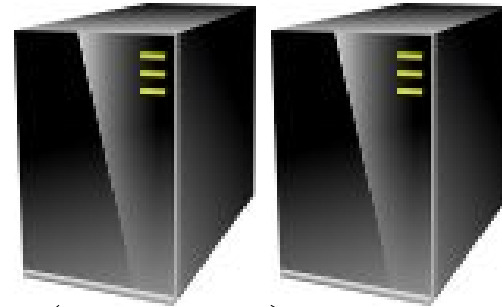


Multi Data Center

Data Center Overview



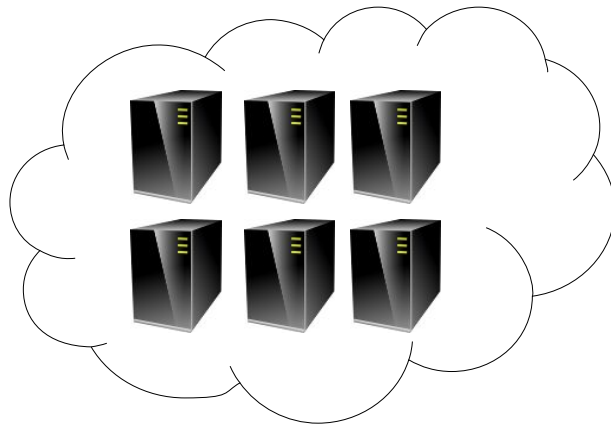
SlapOS Master Overview



- SlapOS Master**
- Deployment
 - Orchestration
 - Accounting
 - Disaster Recovery

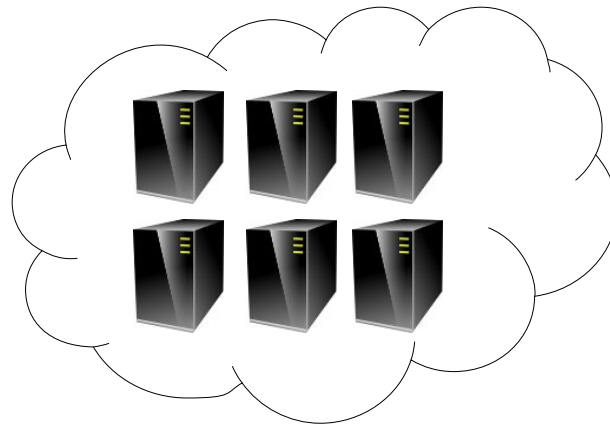
SLAP Protocol

SlapOS Nodes



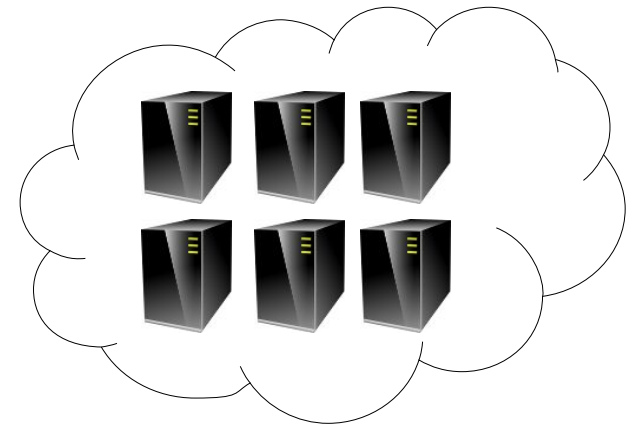
Data Center 1

SlapOS Nodes



Data Center 2

SlapOS Nodes



Data Center 3

SlapOS Node Overview

100+ software instances per server



SlapOS Node



Data Center

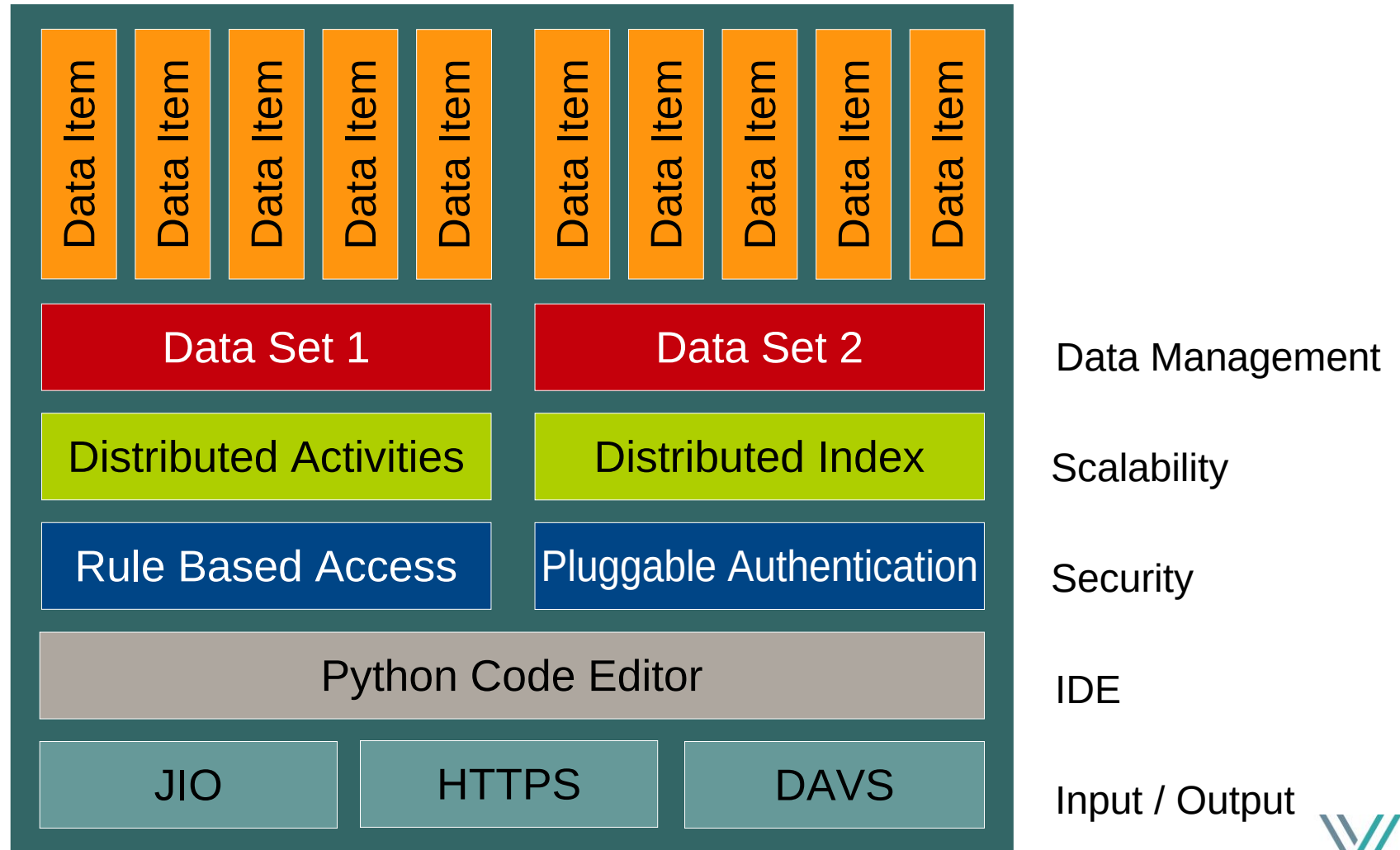


Software Instance

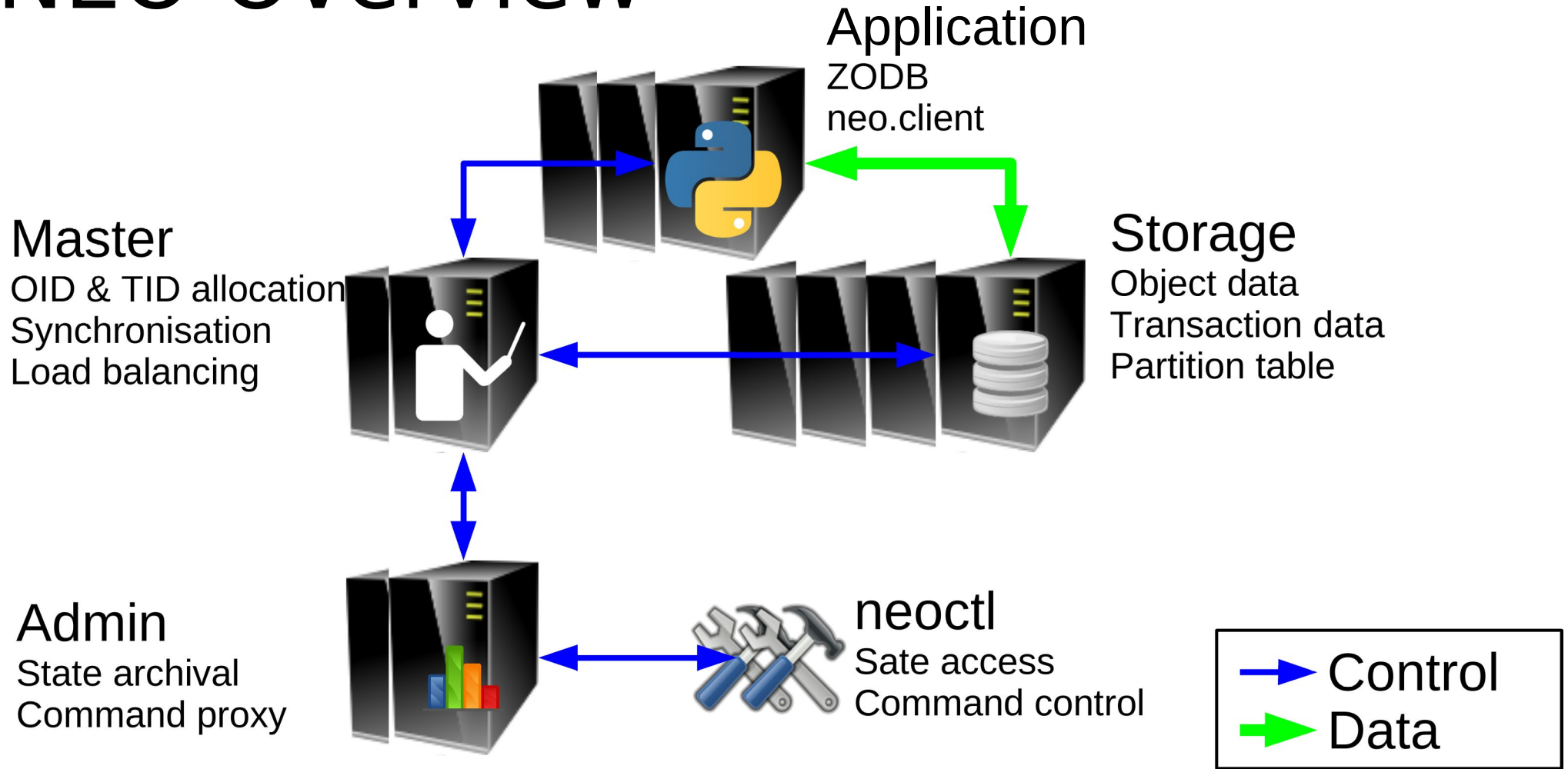
Software Release

SlapOS Kernel

ERP5 PaaS Overview



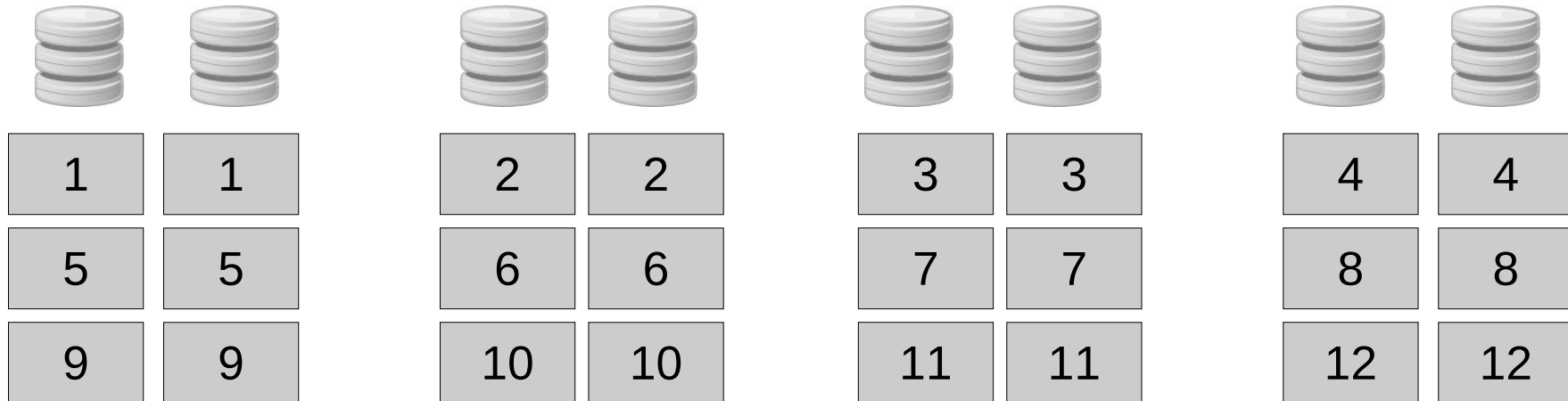
NEO Overview



Numpy Overview

neo.ndarray

1	2	3	4	5	6	7	8	9	10	11	12
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Agenda

- **Architecture Overview**



Design Goals

- **Security**
- **Safety**

Security & Safety

- **Security**

- Data Encryption
- Data Access Rule
- User Authentication
- Computer Authentication
- Software Authentication
- Service Authentication
- Zero Knowledge
- Intrusion protection
- Public Key Infrastructure

- **Safety**

- Availability
- Consistency
- Scalability
- Persistence
- Disaster Recovery

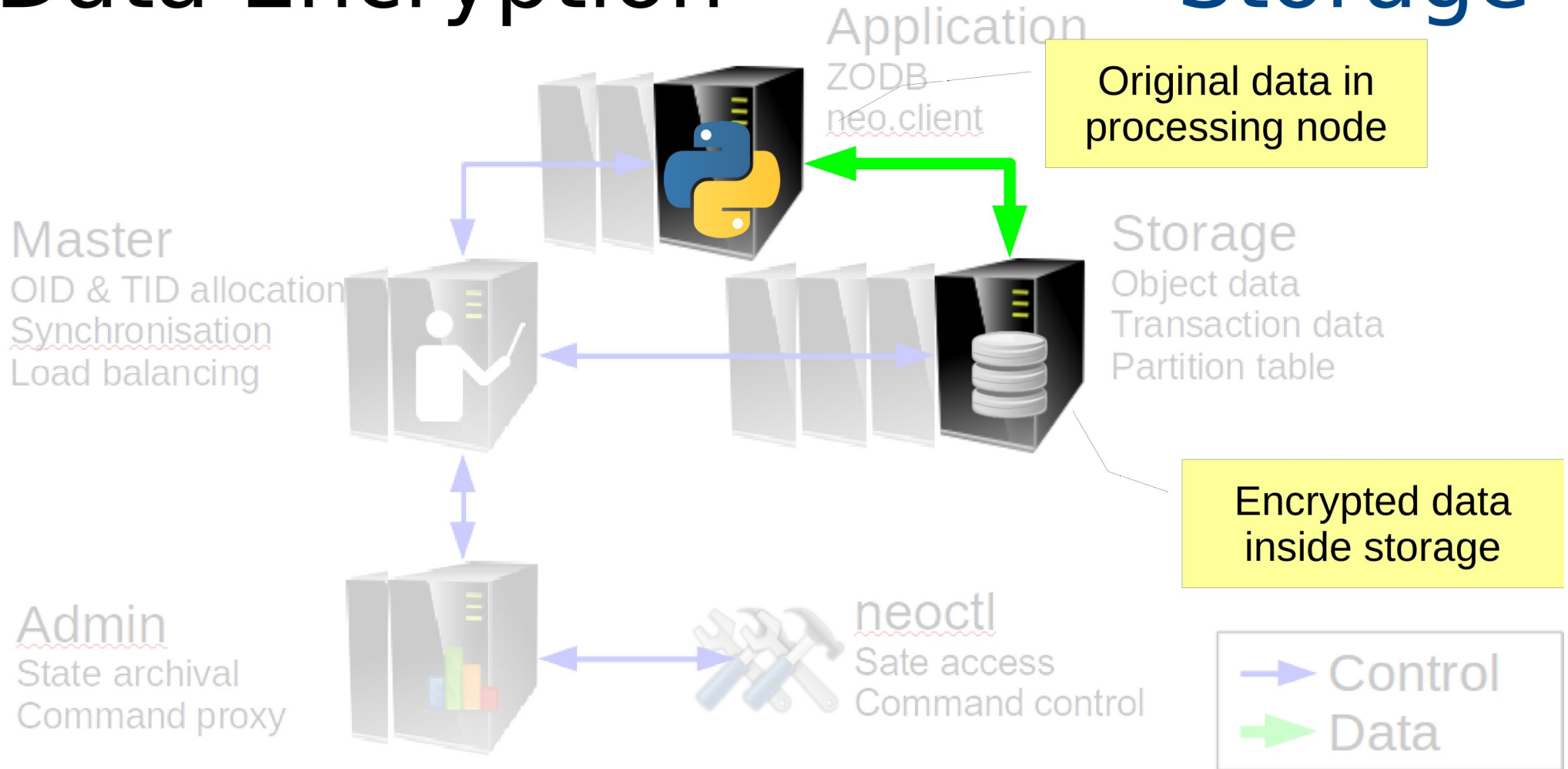
Agenda

- **Architecture Overview**
- **Design Goals**
- **Security**
- **Safety**



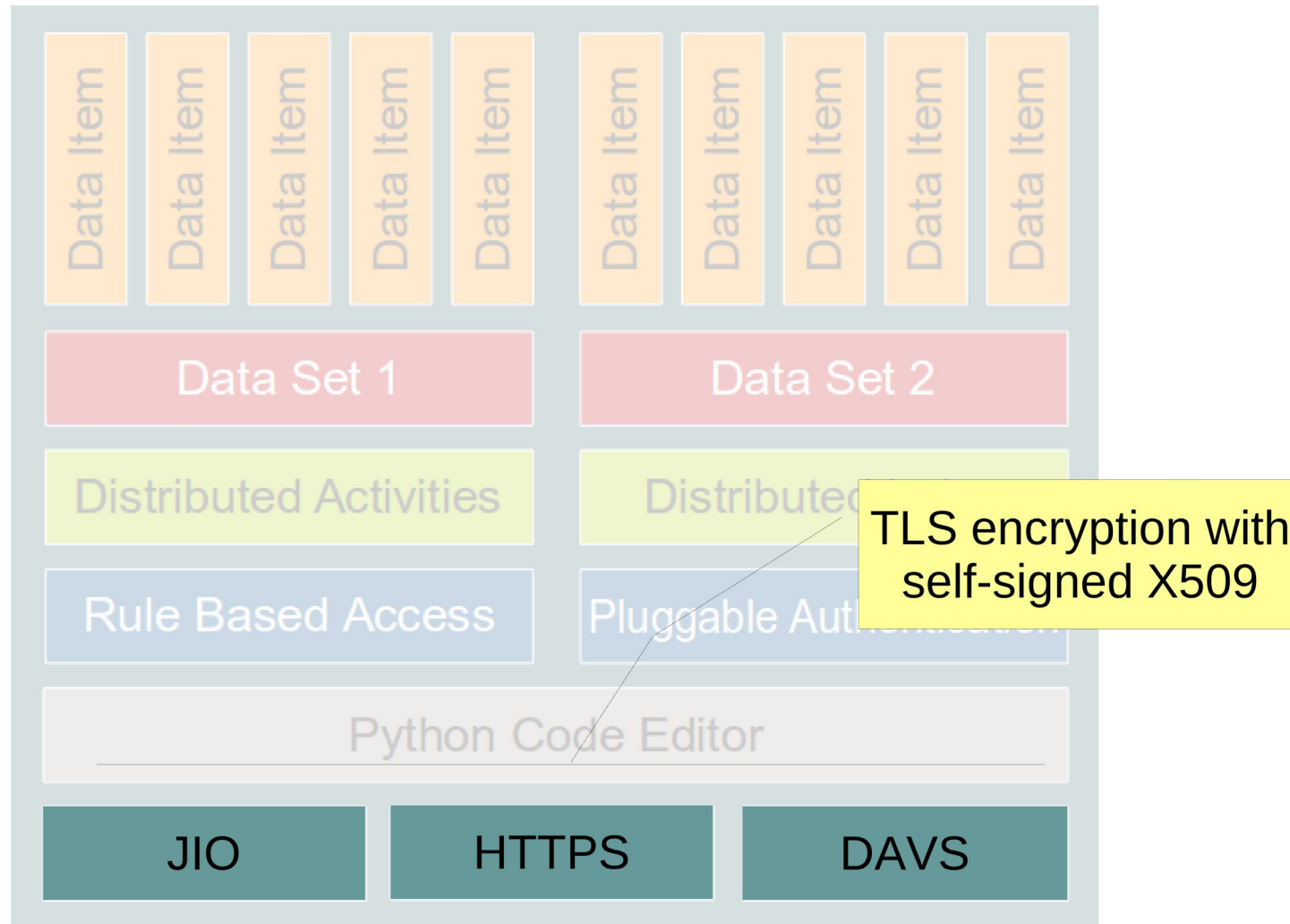
Data Encryption

Storage



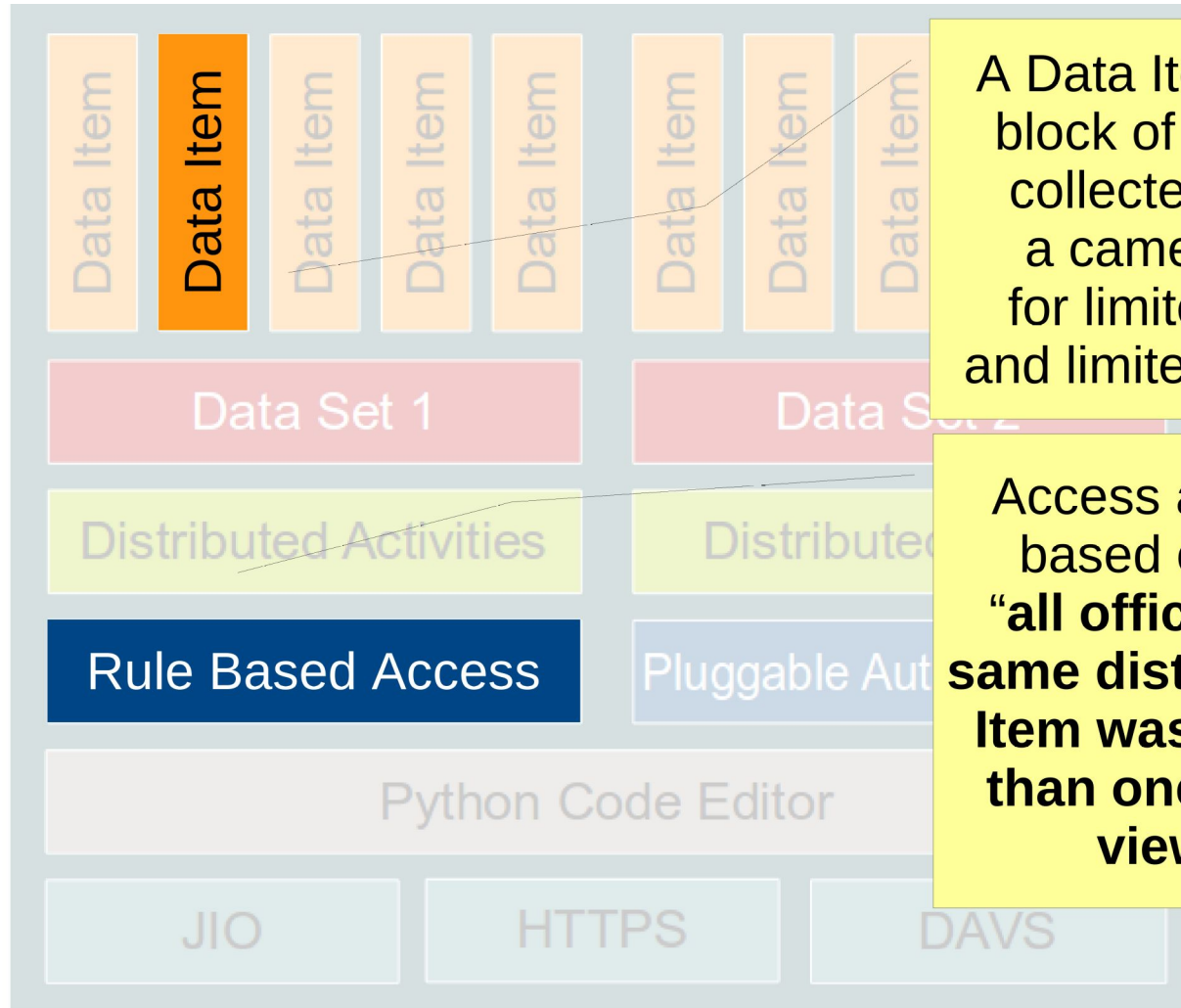
Data Encryption

I/O



Data Access Rules

Data Item

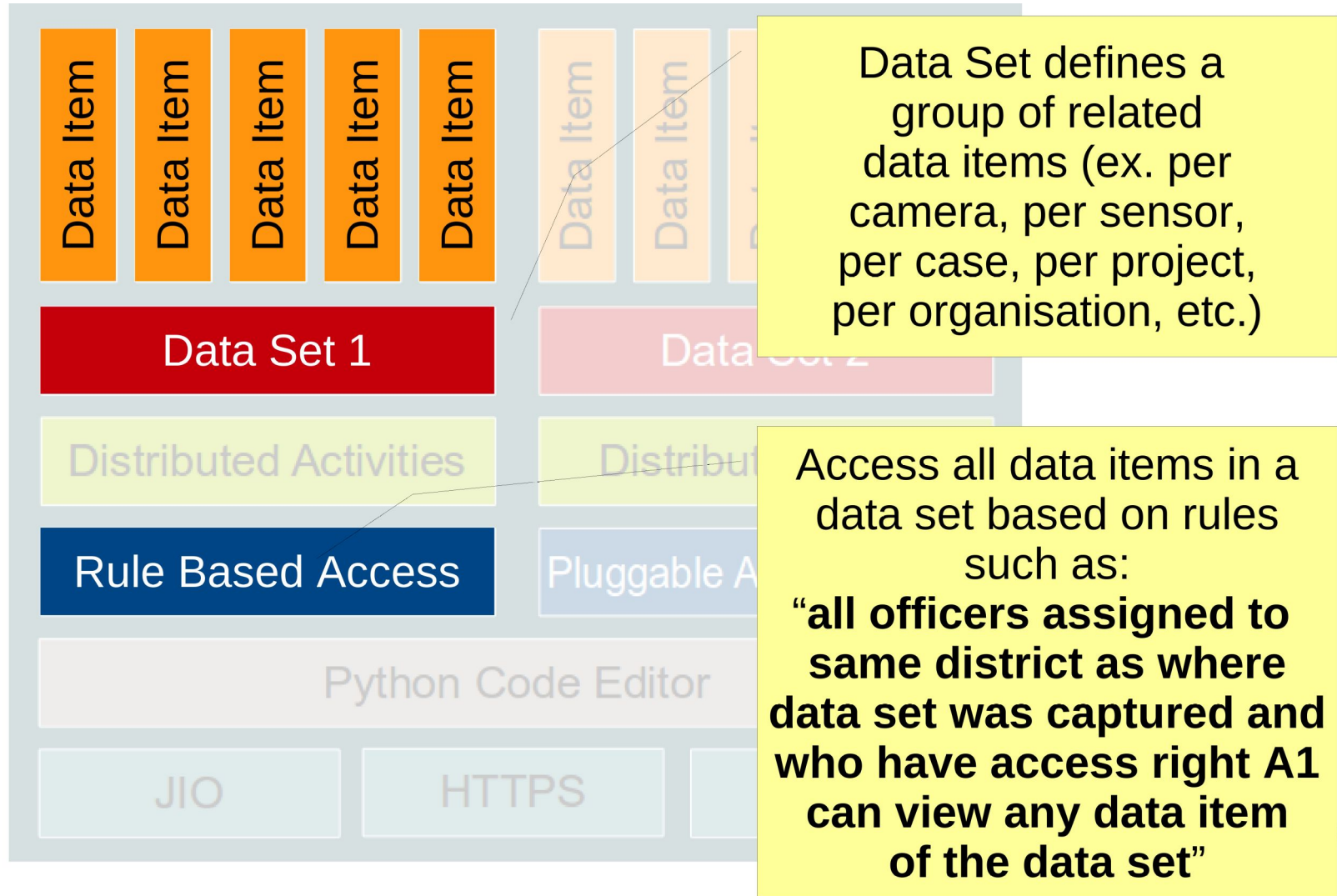


A Data Item is the smallest block of data. It is usually collected from a sensor, a camera or a database for limited period of time and limited geographic area

Access a single data item based on rules such as **“all officers assigned to same district as where data item was captured earlier than one month ago can view data item”**

Data Access Rules

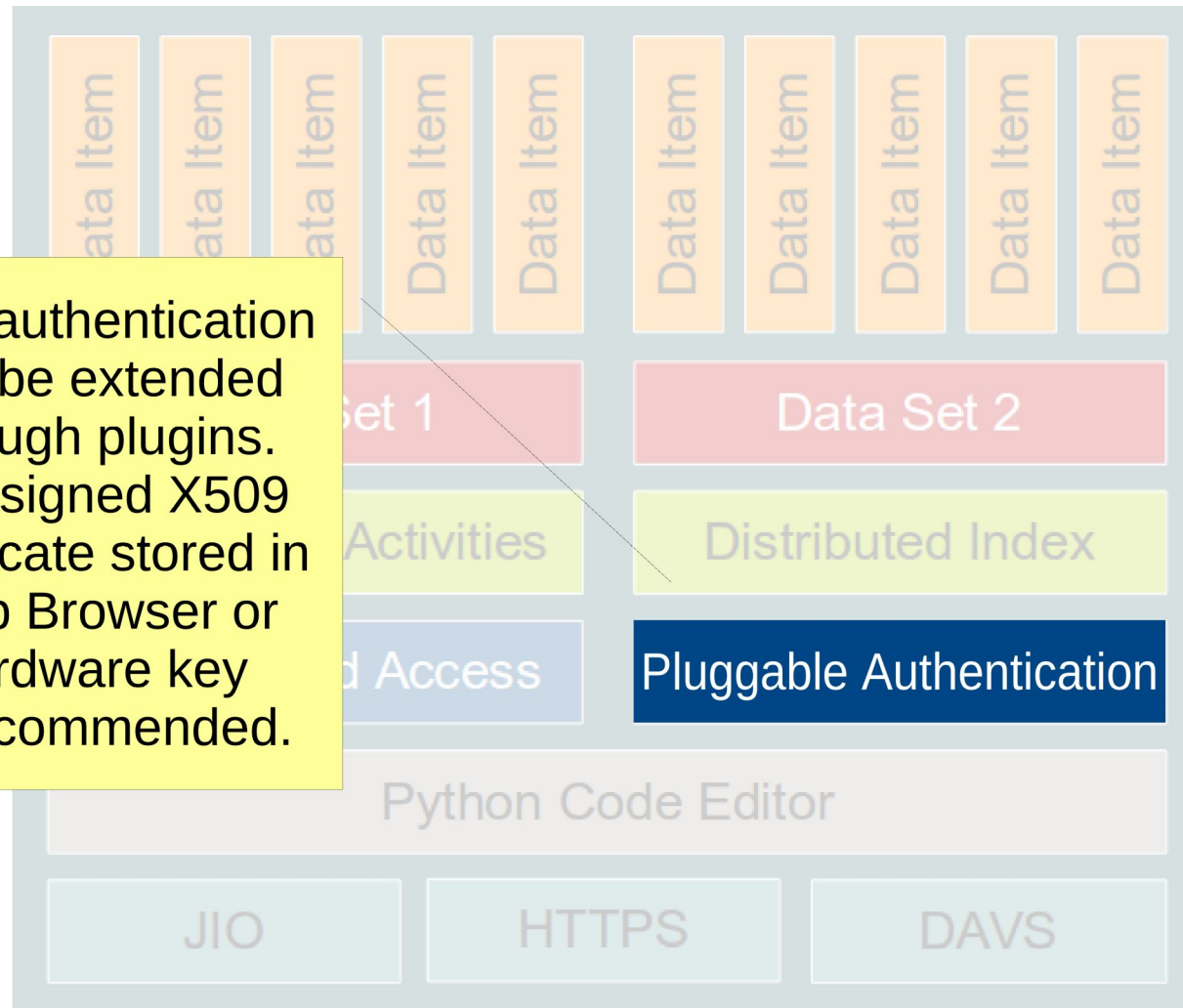
Data Set



User Authentication

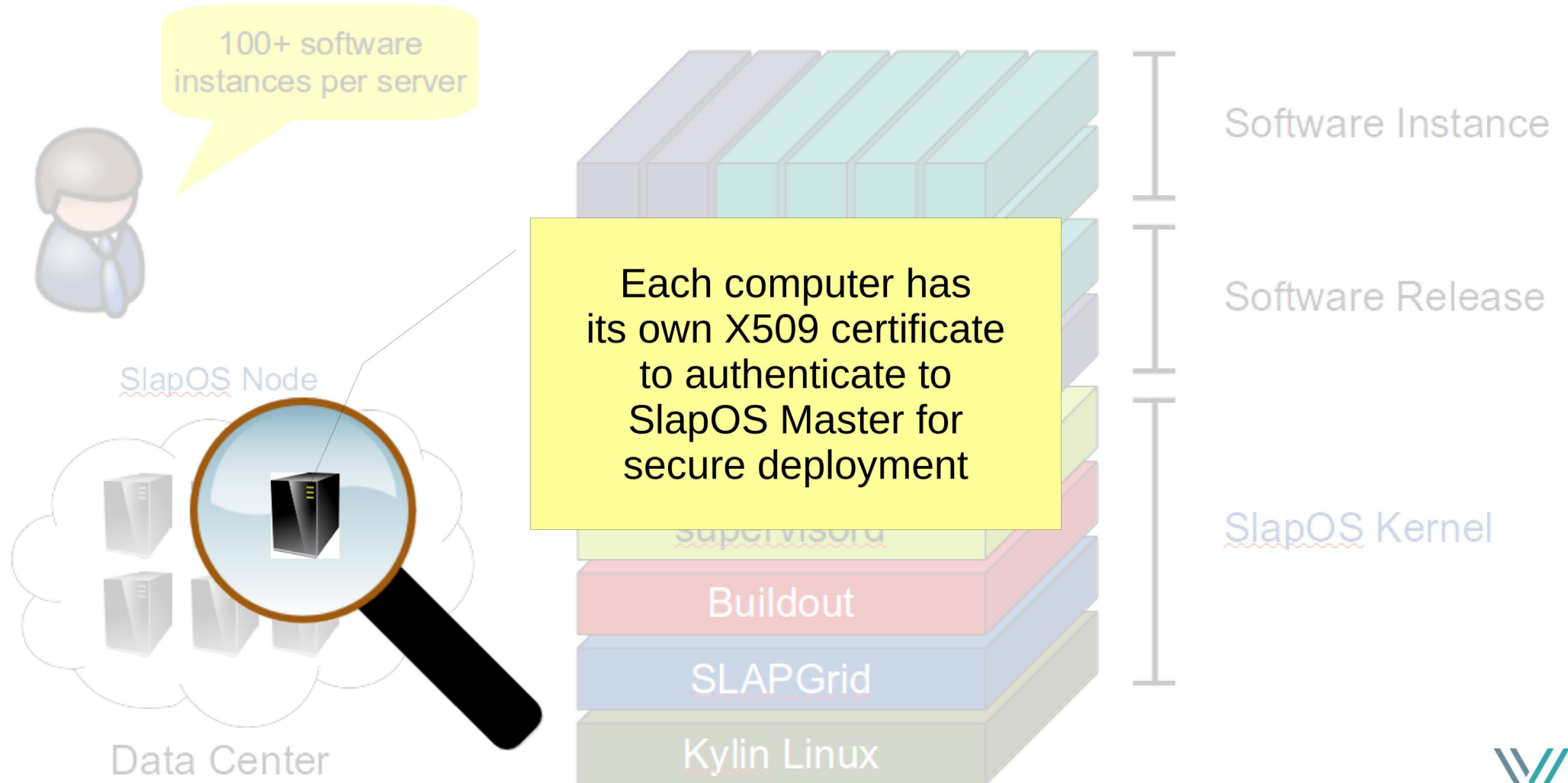
X509

User authentication can be extended through plugins. Self-signed X509 certificate stored in Web Browser or hardware key is recommended.



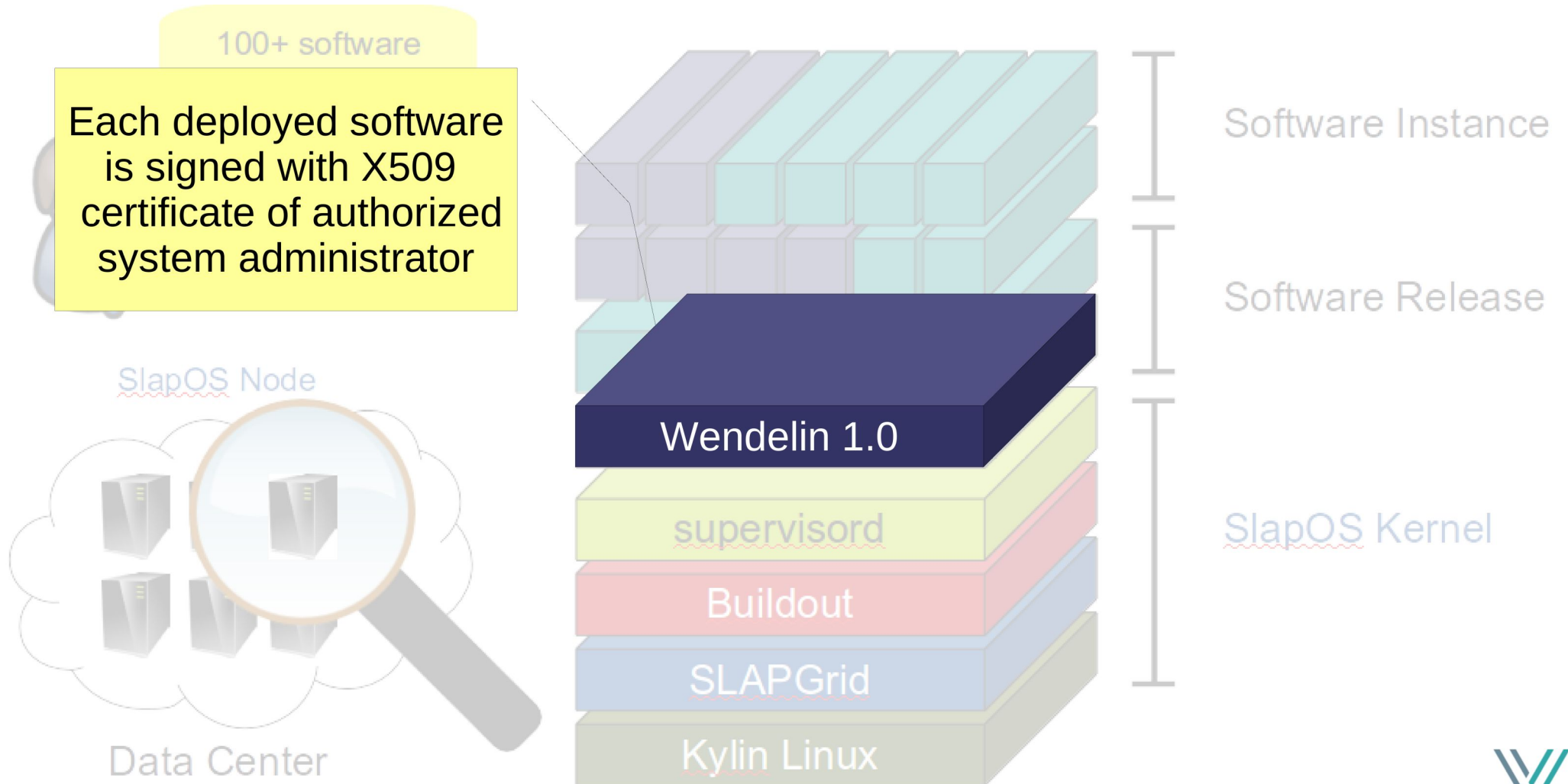
Computer Authentication

X509



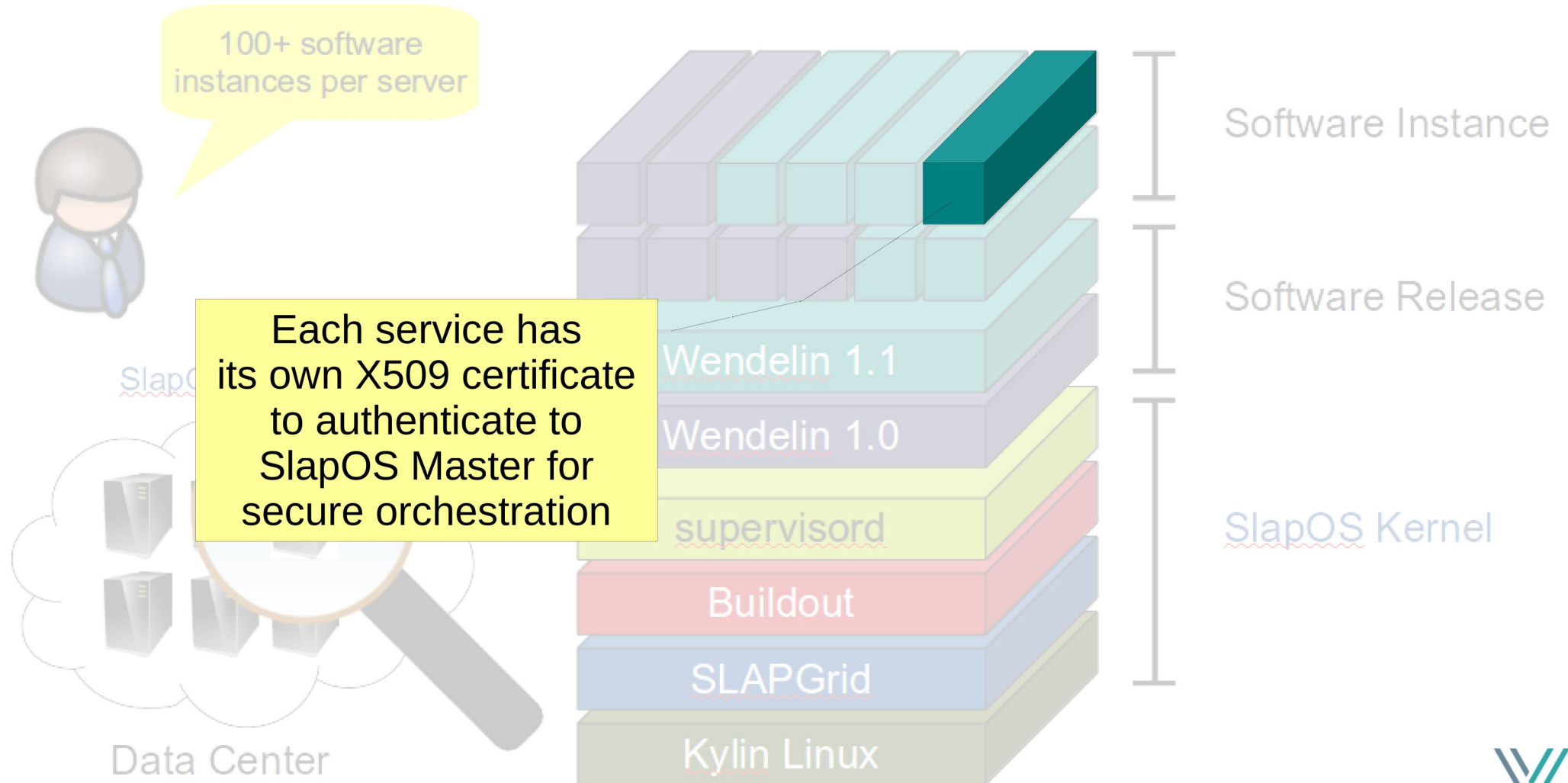
Software Authentication

X509



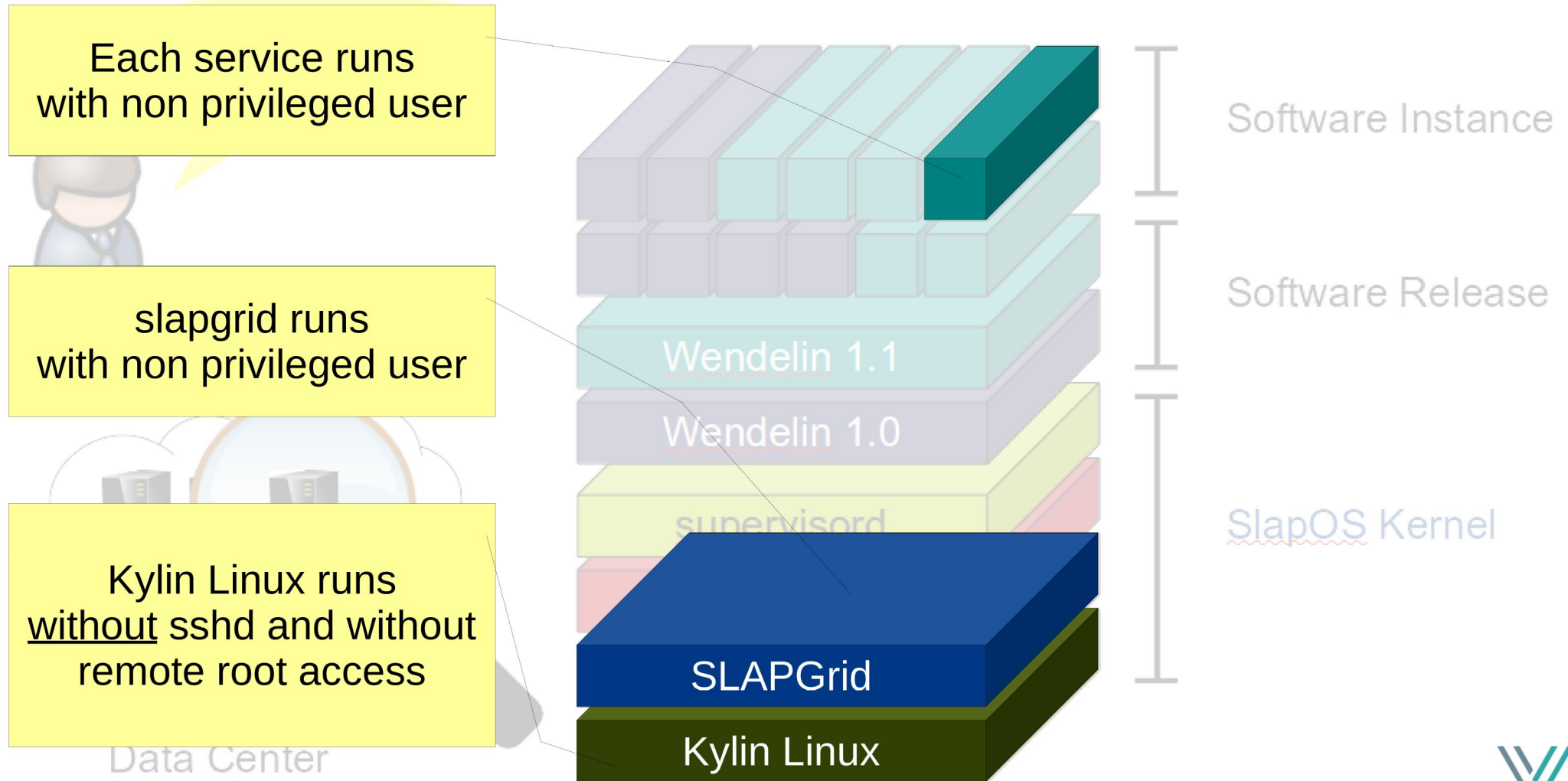
Service Authentication

X509



Zero Knowledge

zero root



Zero Knowledge

zero password

No password or credential to access running services is kept in SlapOS Master



SlapOS Master

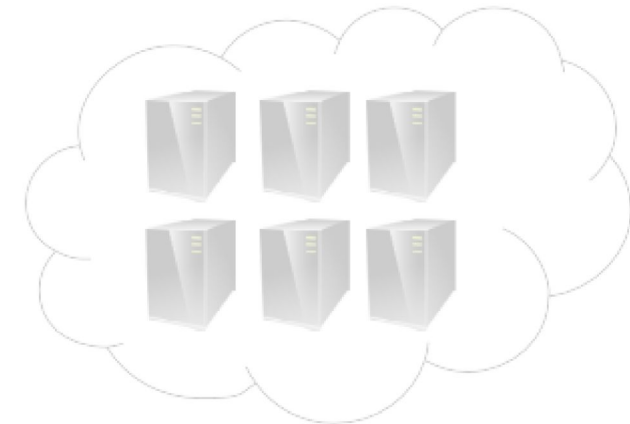
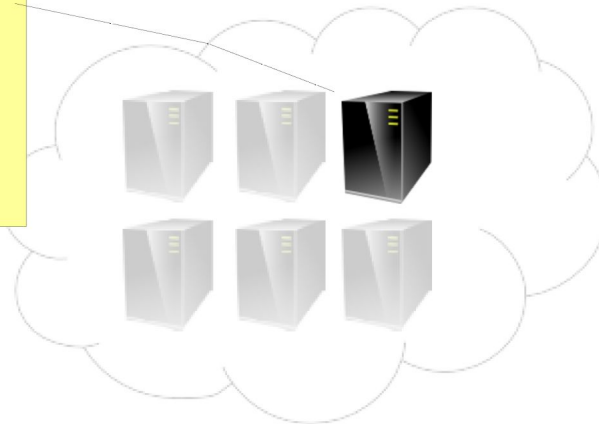
- Deployment
- Orchestration
- Accounting
- Disaster Recovery

SLAP Protocol

Credentials to access a service are kept as a hash in the computer that runs the service

SlapOS Nodes

SlapOS Nodes

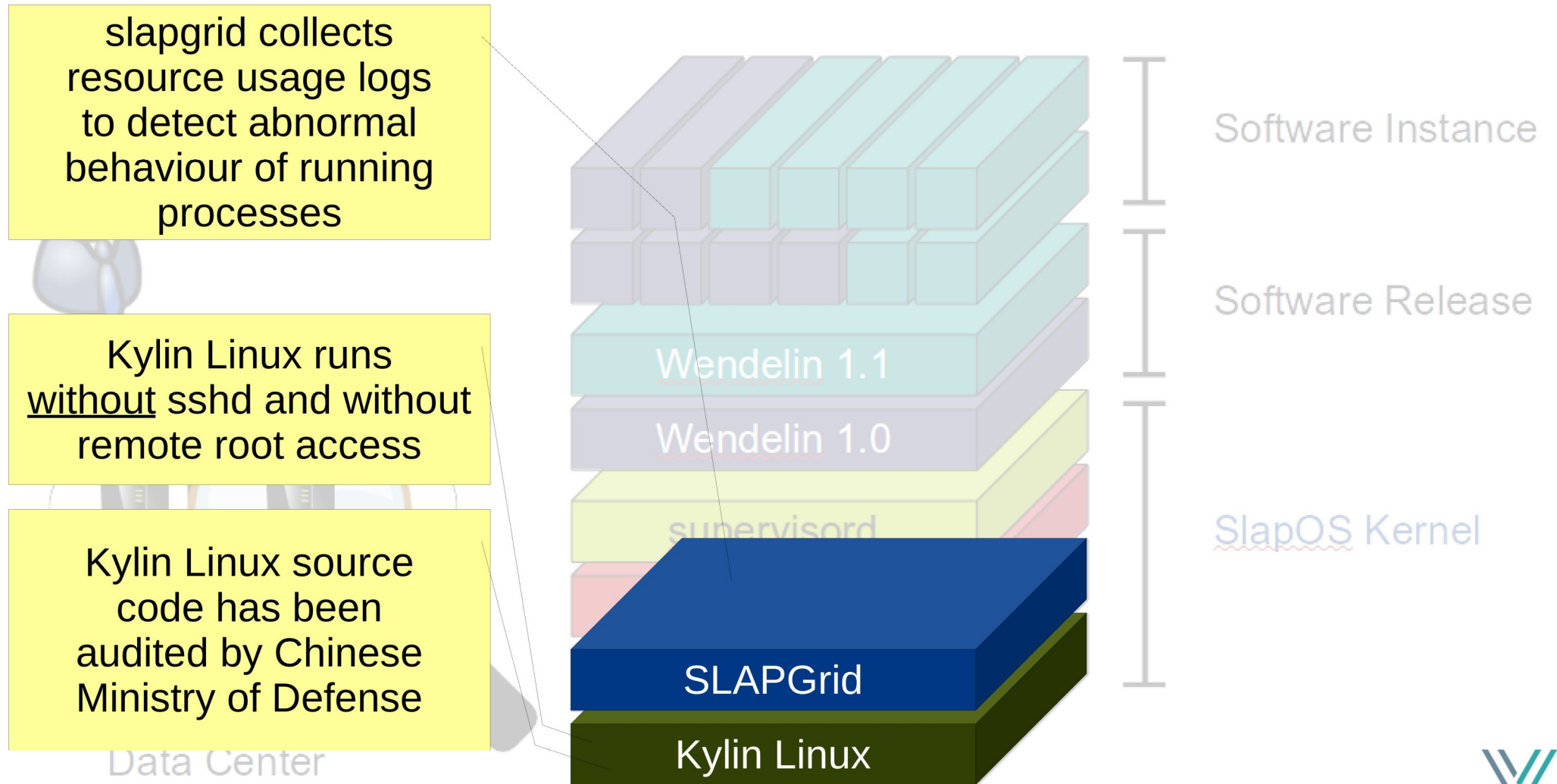


Data Center 1

Data Center 2

Data Center 3

Intrusion Protection



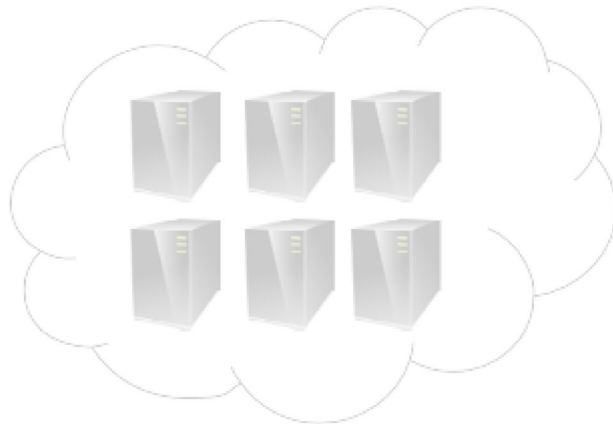
Public Key Infrastructure (PKI)

SlapOS Master acts as PKI and generates X509 certificates for users, computers, software and services



SlapOS Master
- Deployment
- Orchestration
- Accounting
- Disaster Recovery

SlapOS Nodes



Data Center 1

SlapOS Nodes



Data Center 2

SlapOS Nodes



Data Center 3

Agenda

- **Architecture Overview**
- **Design Goals**
- **Security**



Safety

Availability

SlapOS

System remains available
in case of unavailability
of SlapOS master

System remains available
in case of unavailability
of SlapOS node



SlapOS Master

- Deployment
- Orchestration
- Accounting
- Disaster Recovery

SlapOS Nodes



Data Center 1

SlapOS Nodes



Data Center 2

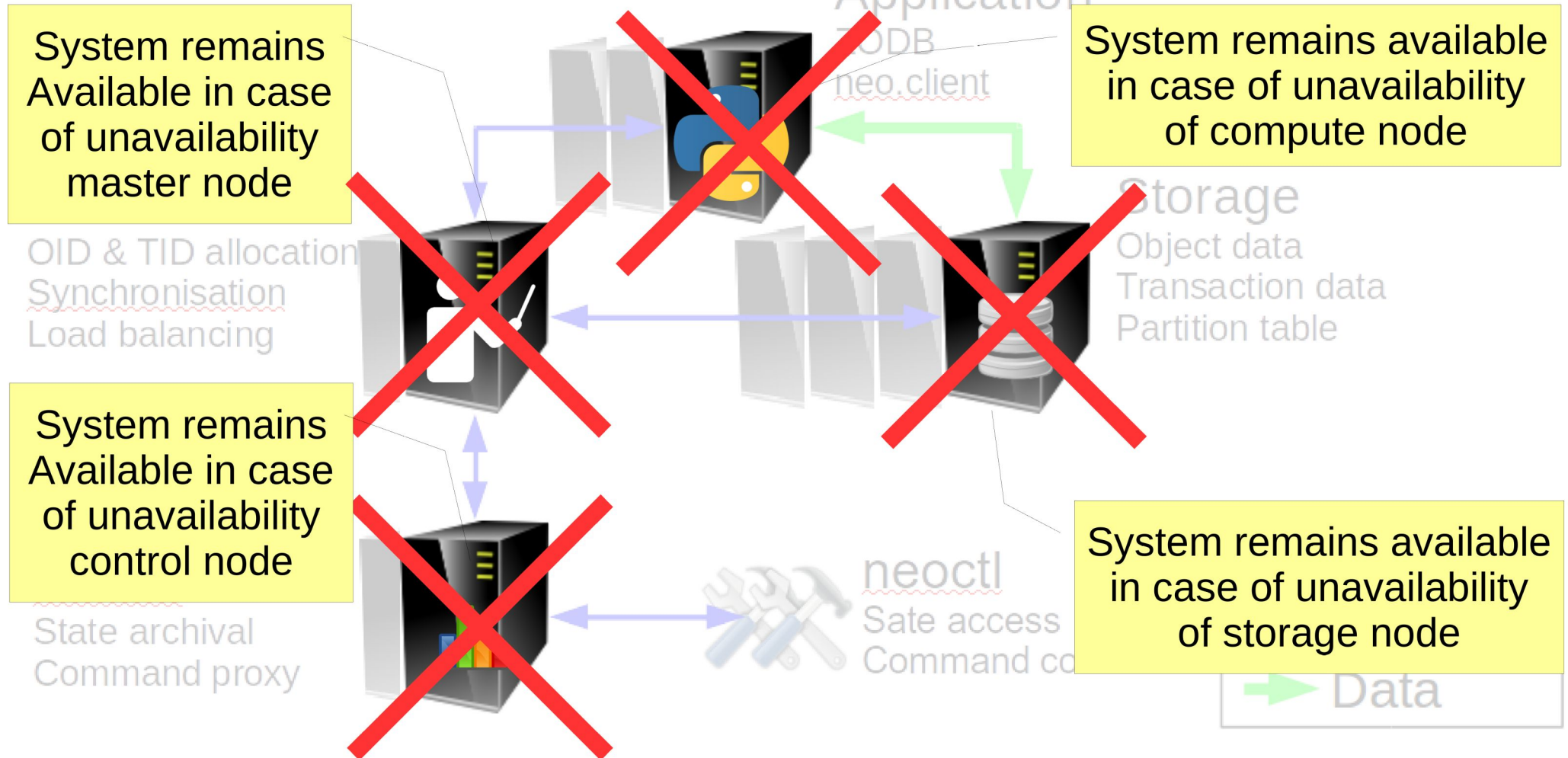
SlapOS Nodes



Data Center 3

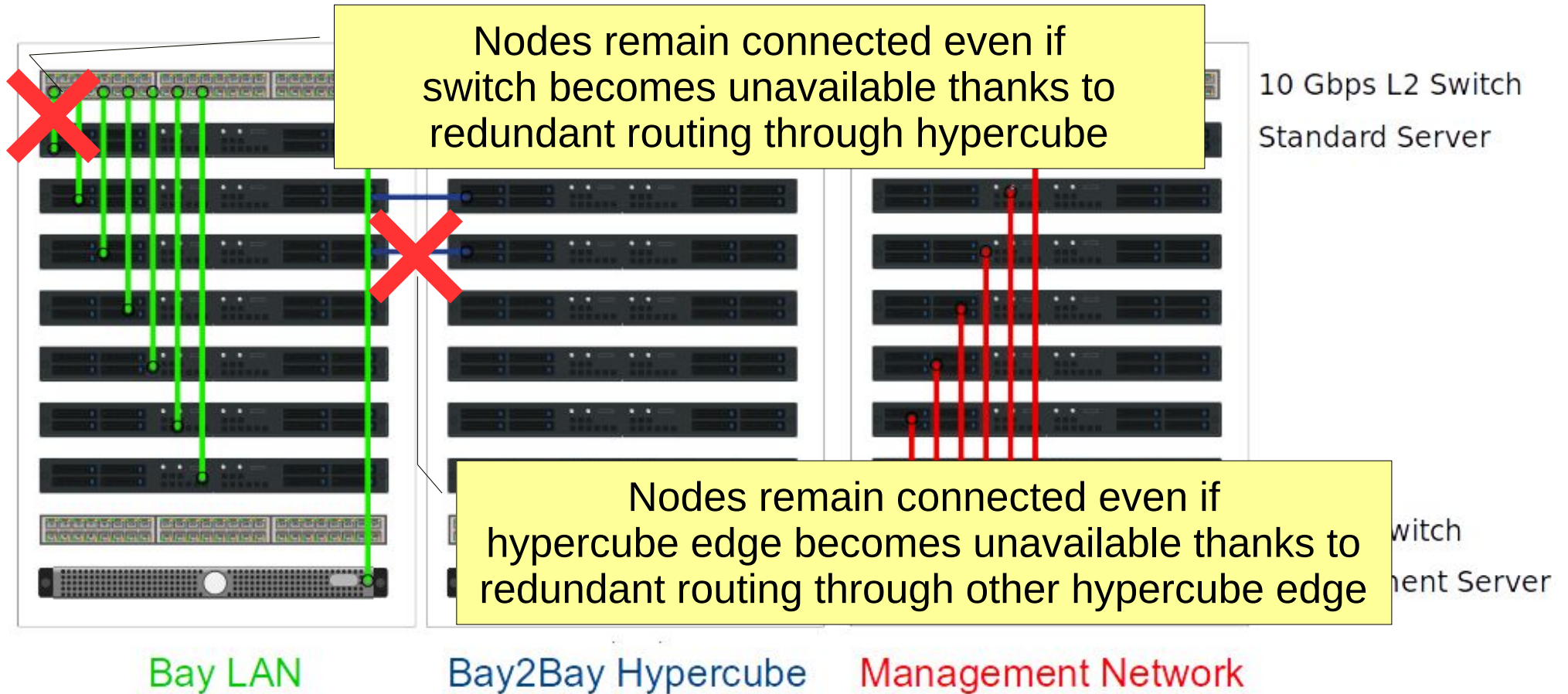
Availability

NEO



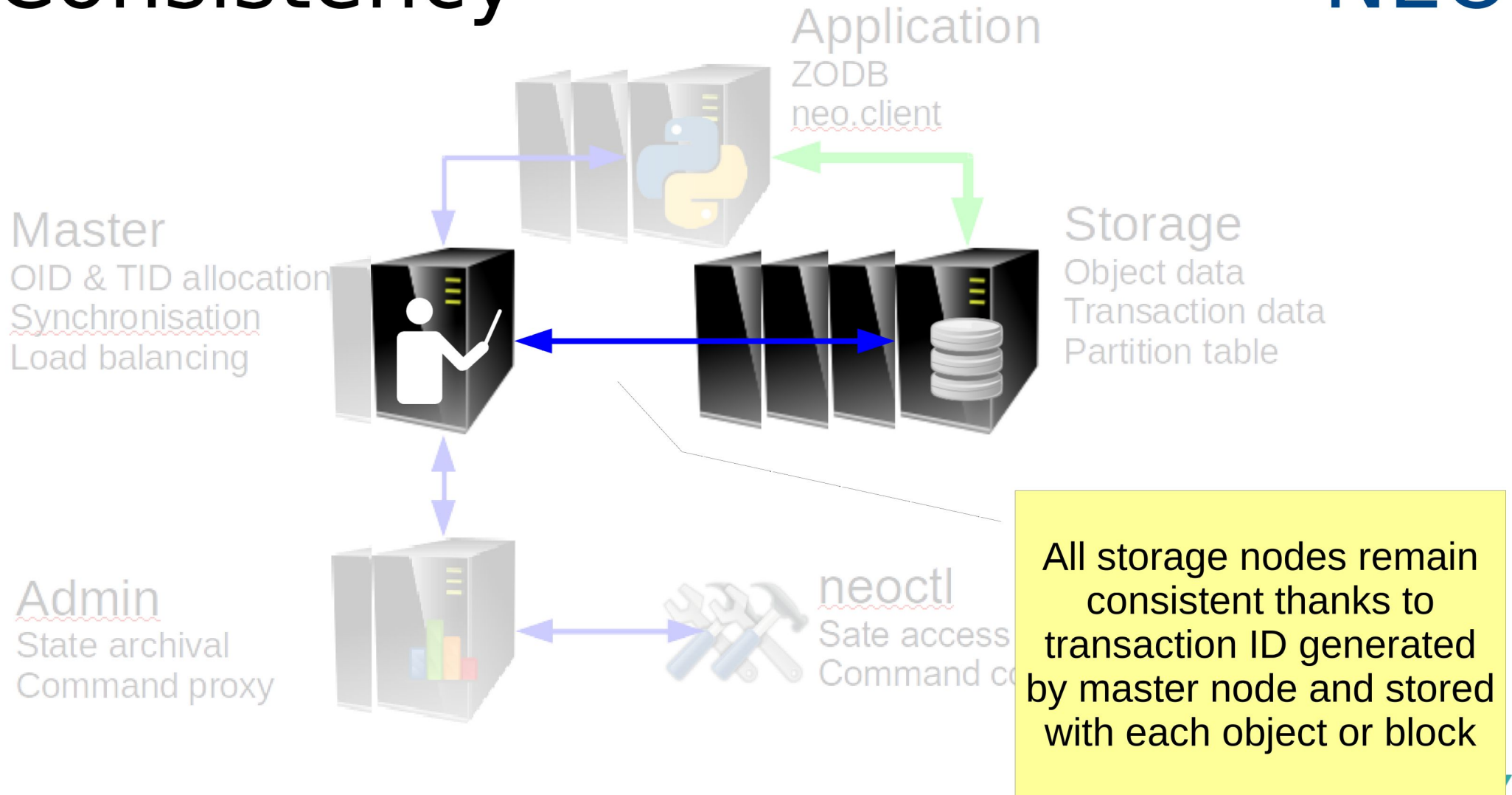
Availability

LAN



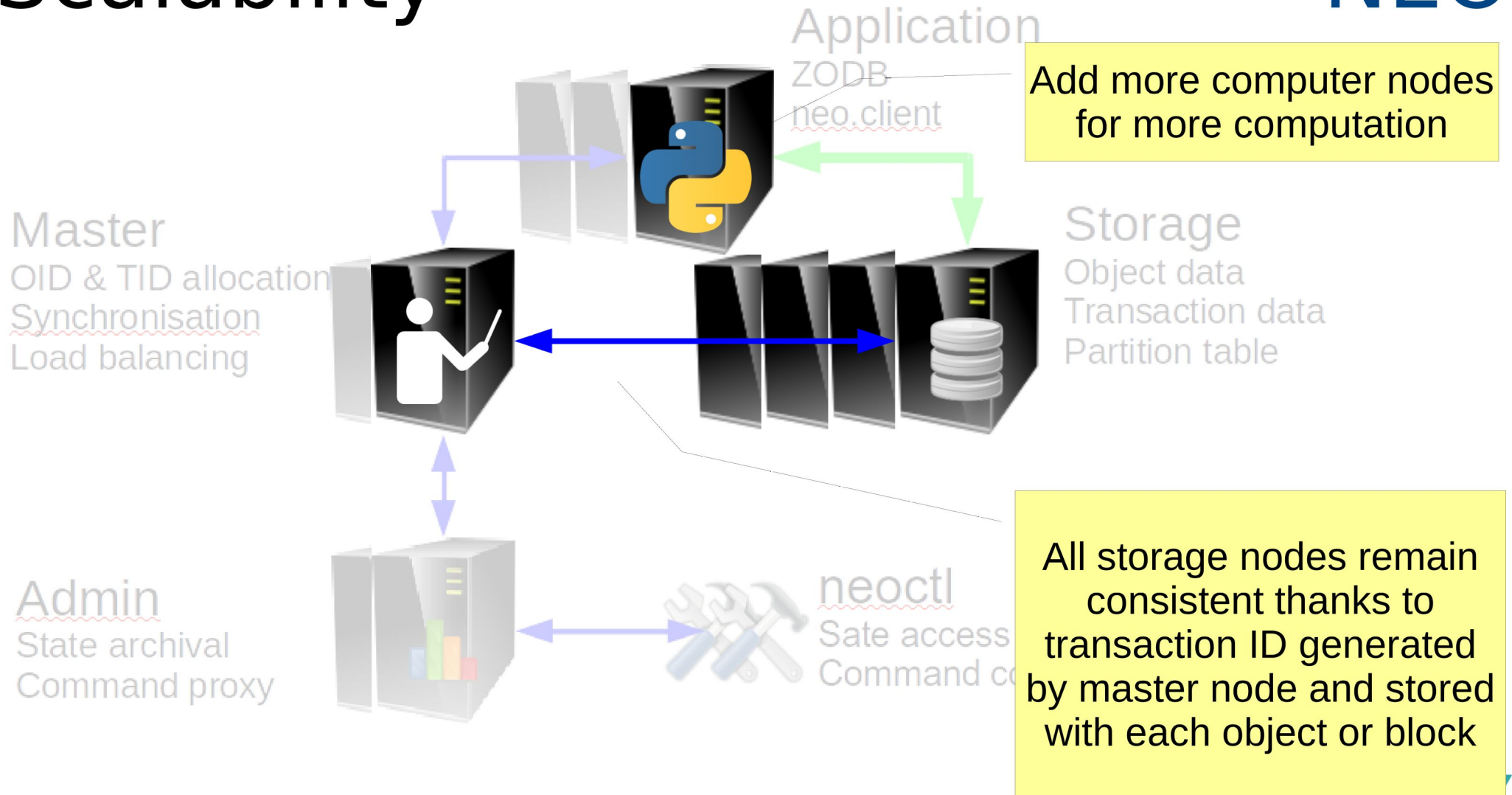
Consistency

NEO



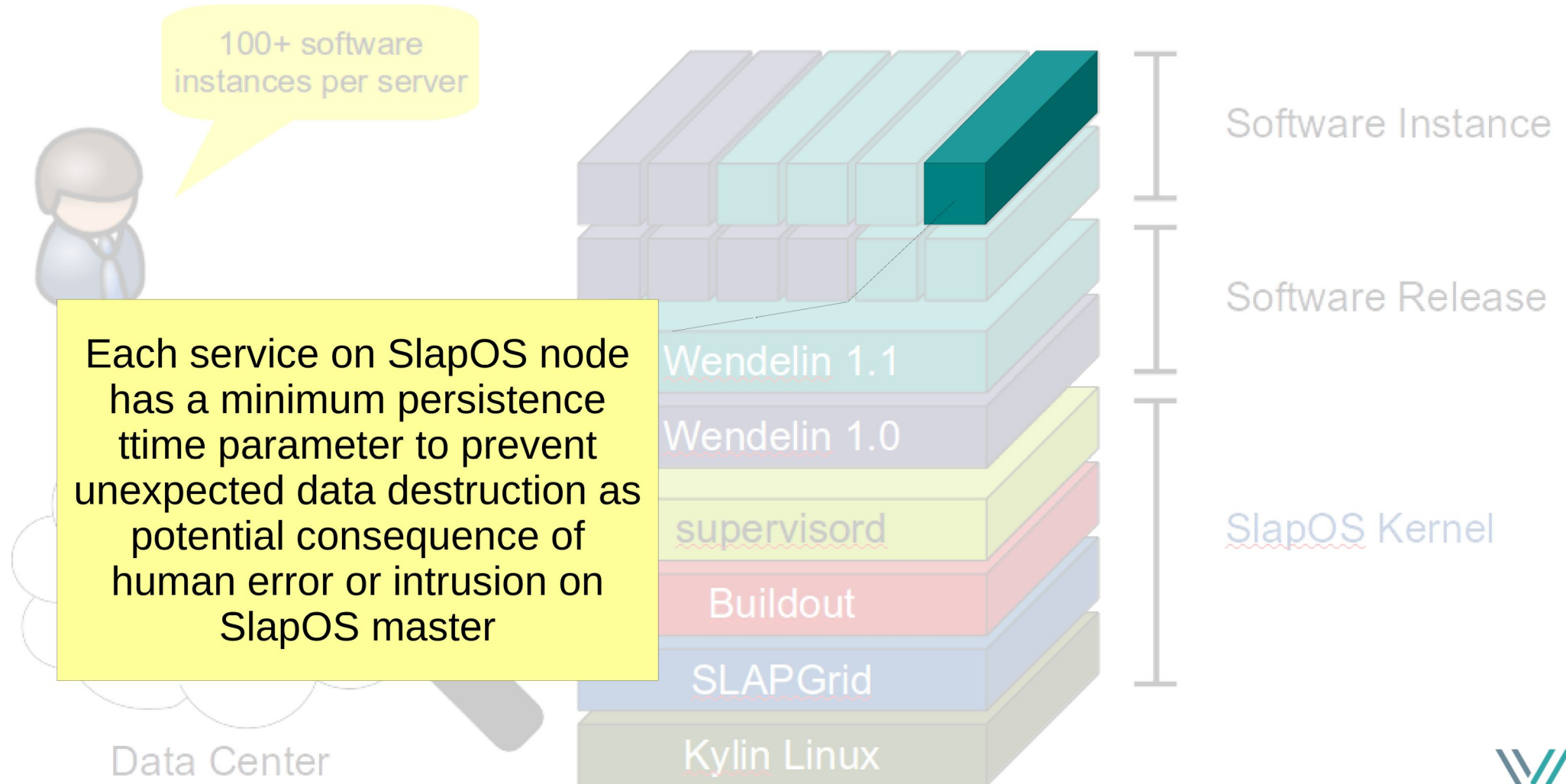
Scalability

NEO



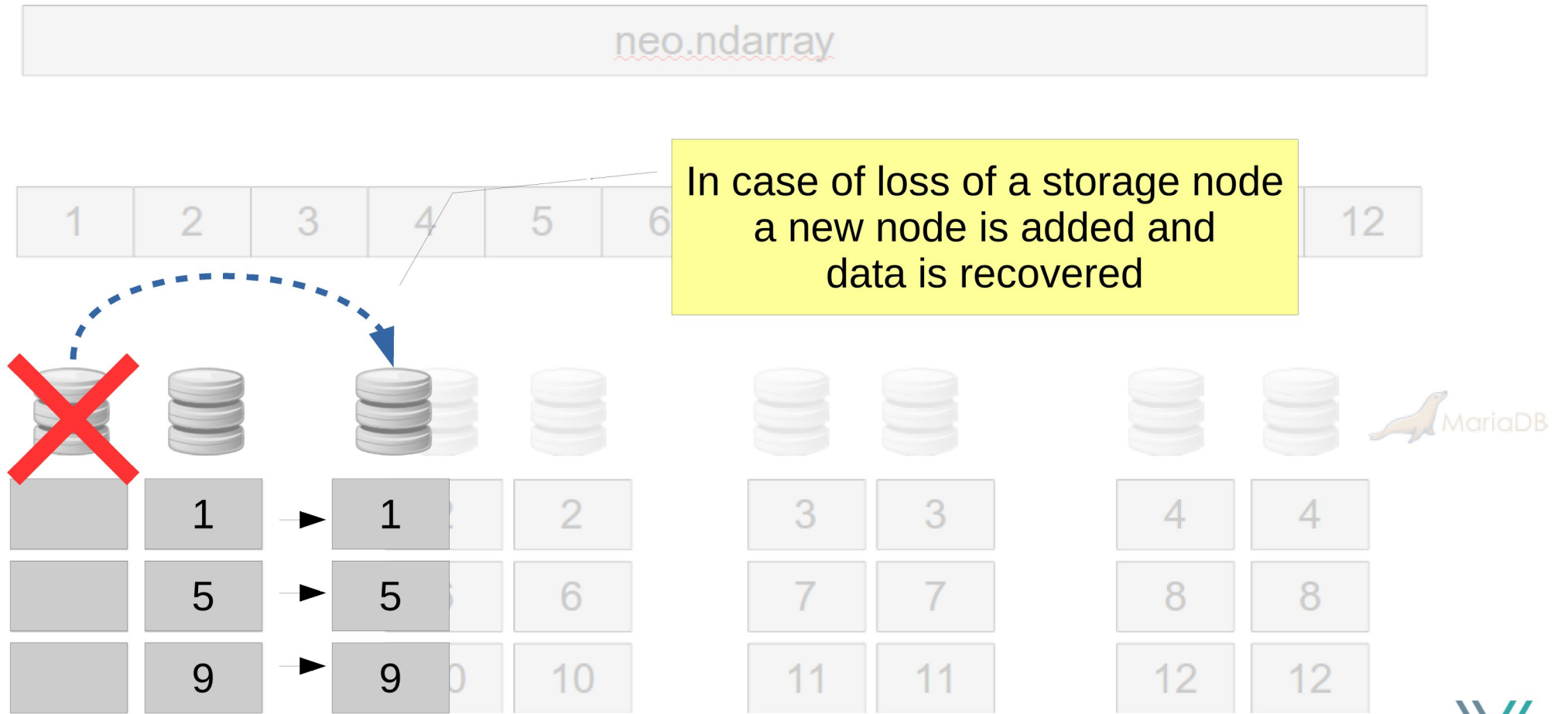
Persistence

SlapOS



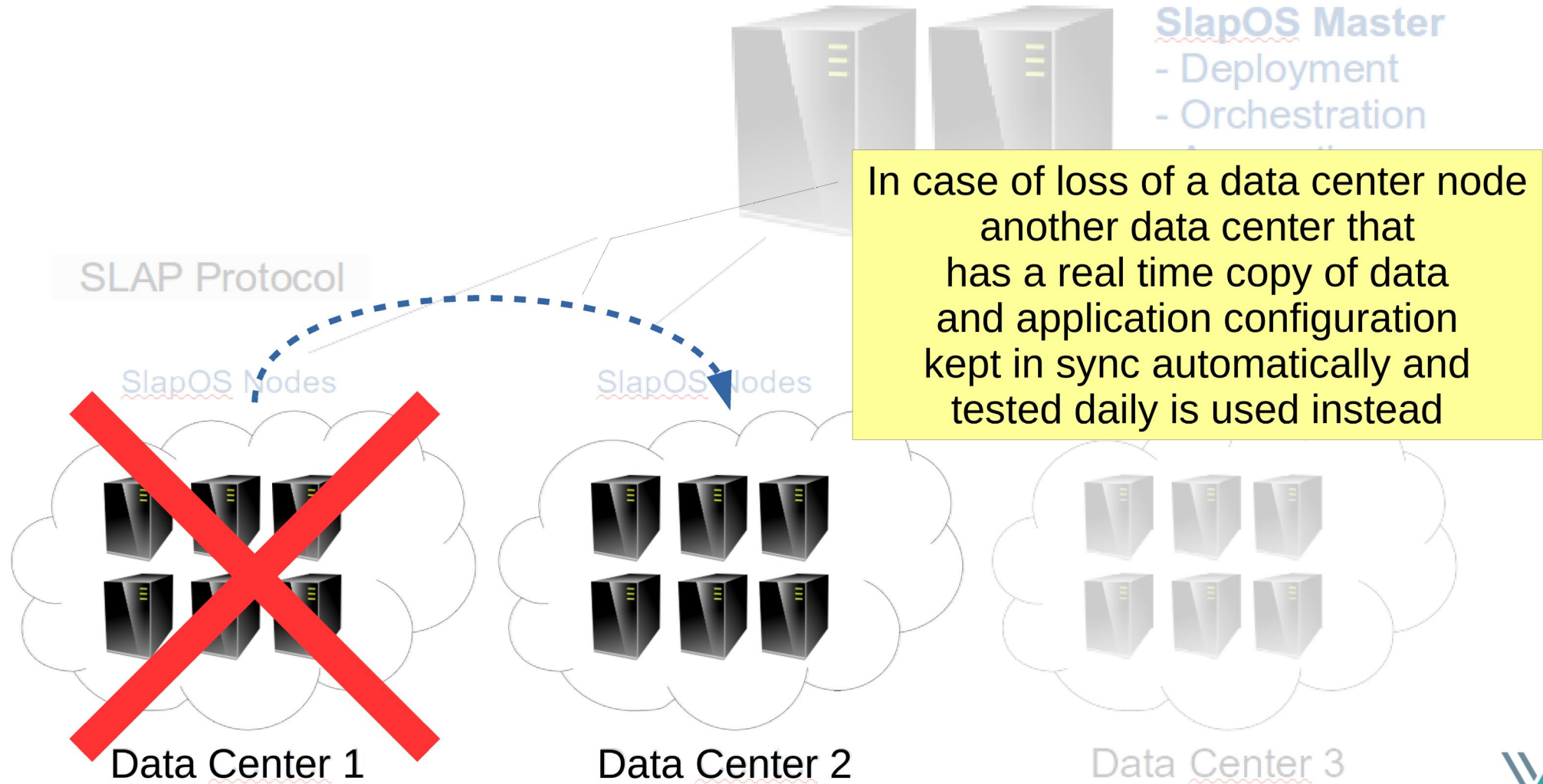
Disaster Recovery

Storage



Disaster Recovery

Datacenter





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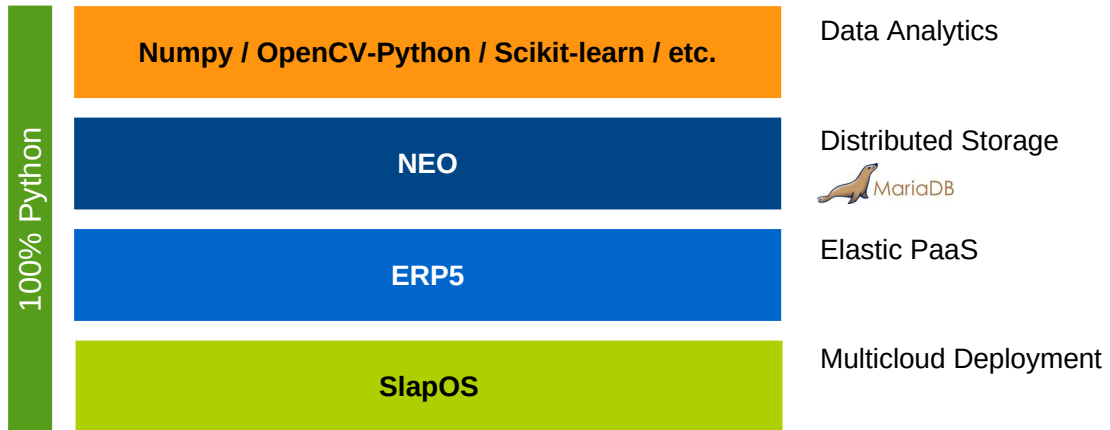


Architecture Overview

- **Design Goals**
- **Security**
- **Safety**

Wendelin Core

100% open source

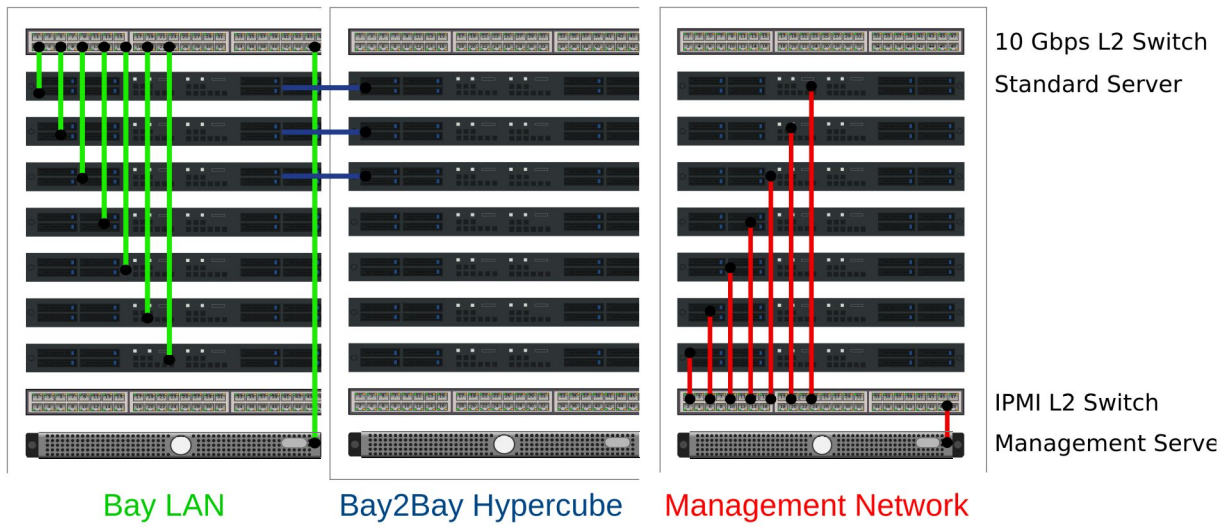


Multi Data Center

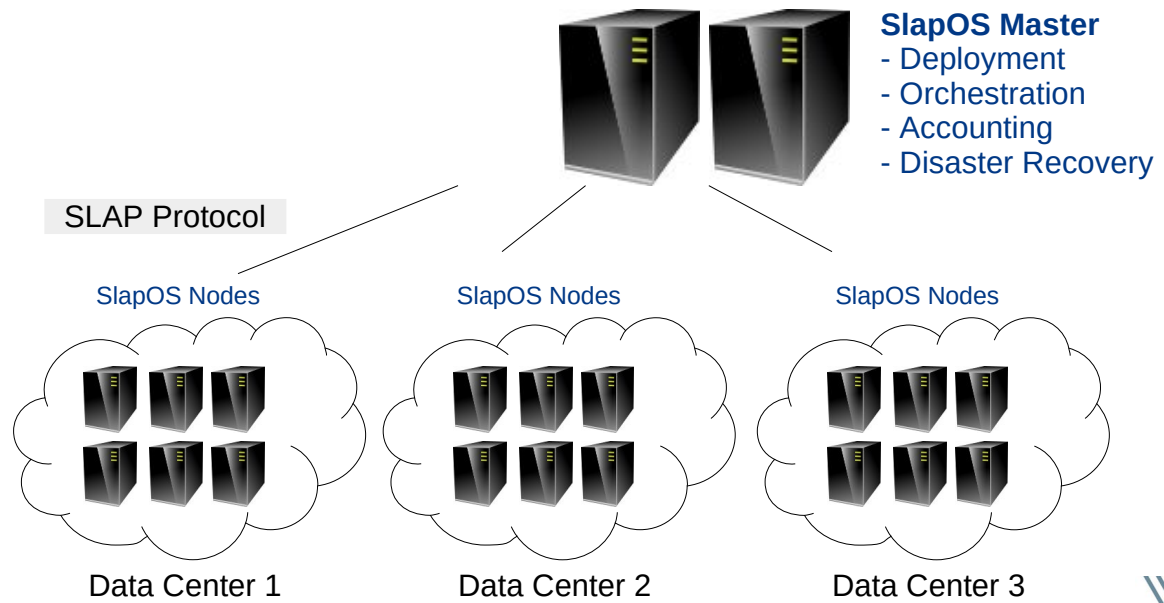
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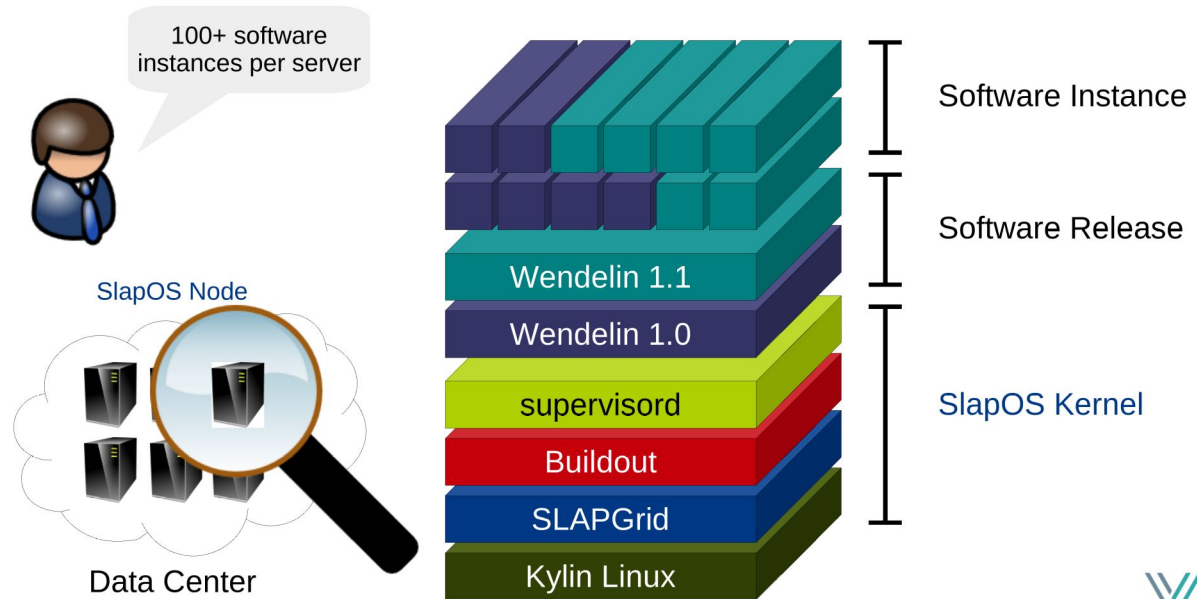
Data Center Overview



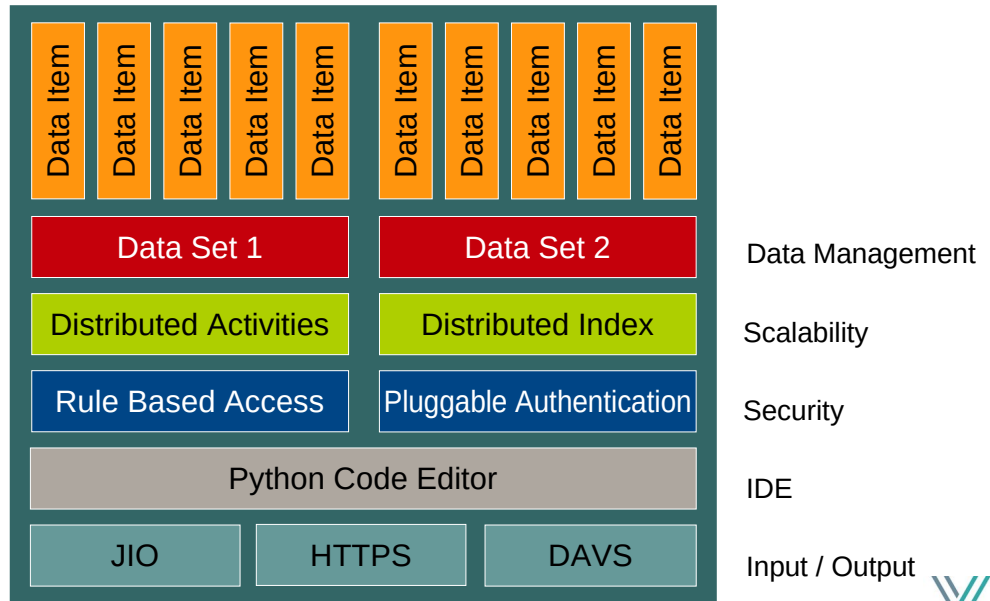
SlapOS Master Overview



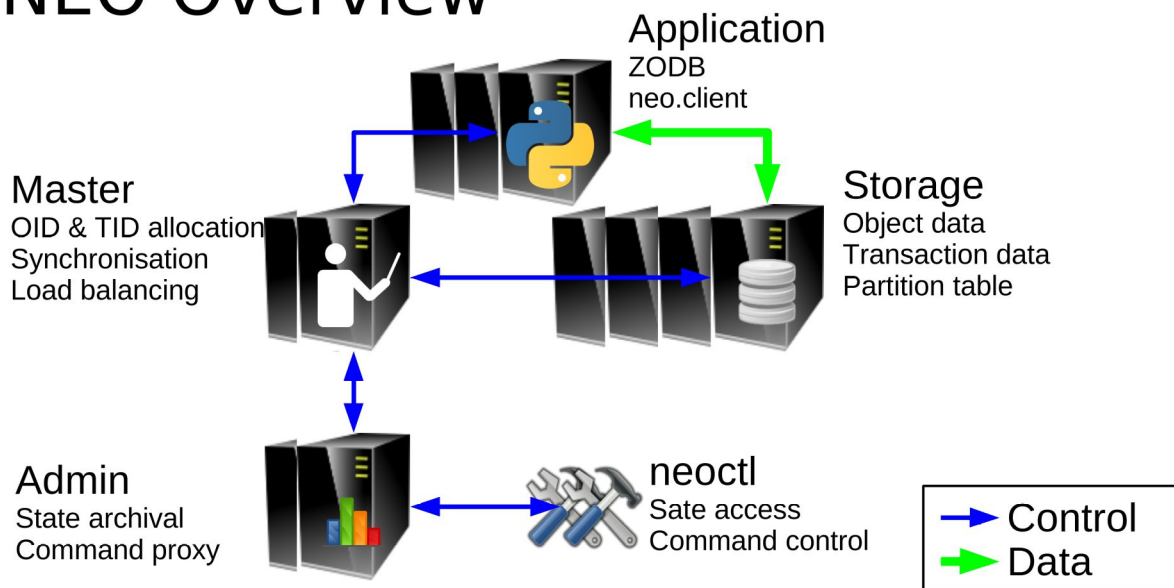
SlapOS Node Overview



ERP5 PaaS Overview



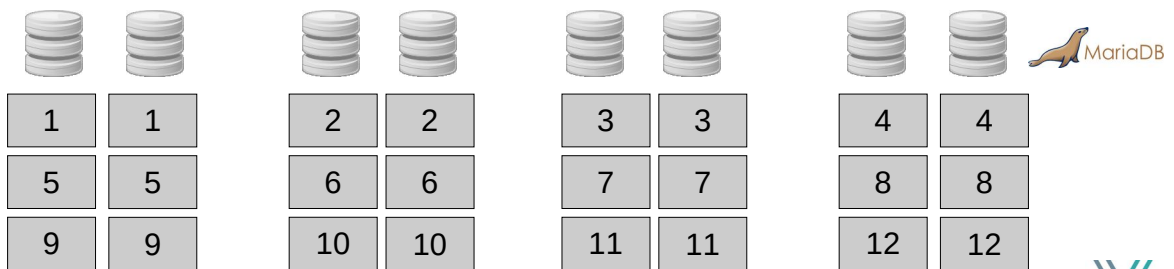
NEO Overview



Numpy Overview

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Security & Safety

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- Zero Knowledge
- Intrusion protection
- Public Key Infrastructure

- **Safety**

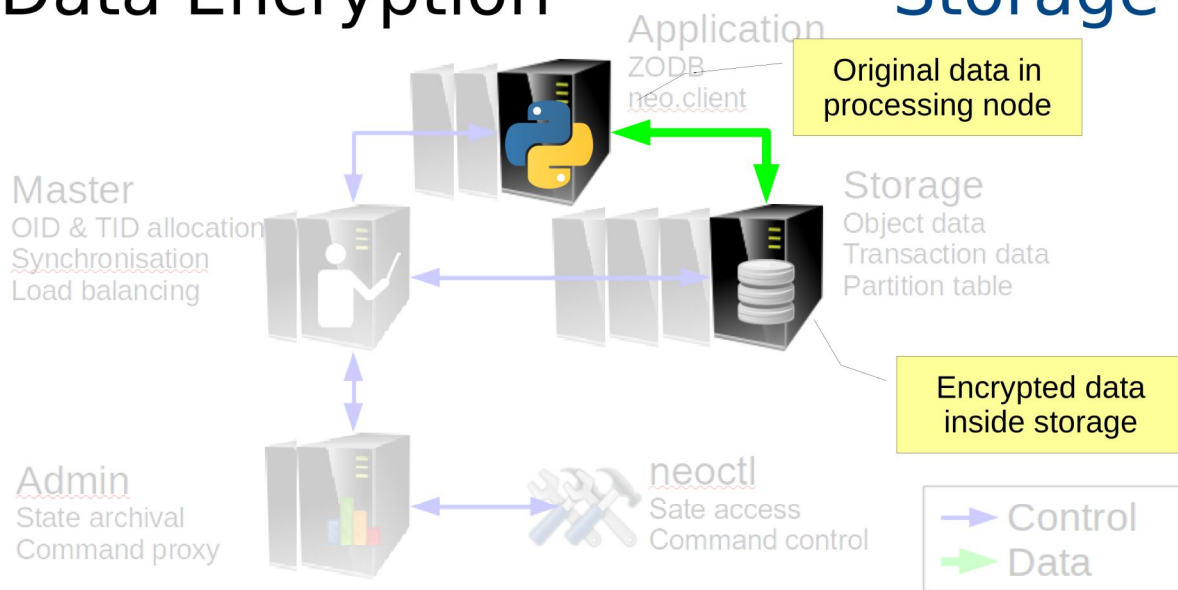
- Availability
- Consistency
- Scalability
- Persistence
- Disaster Recovery

Agenda

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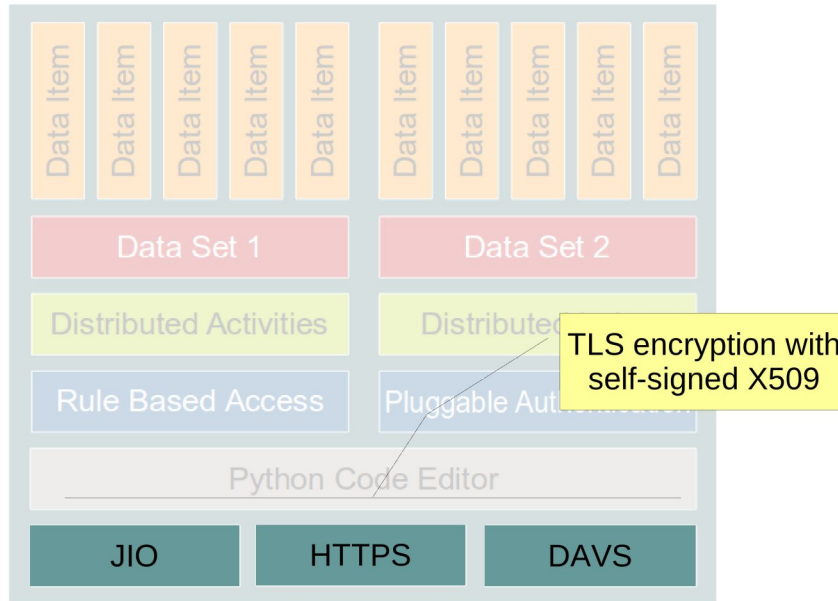
Data Encryption

Storage



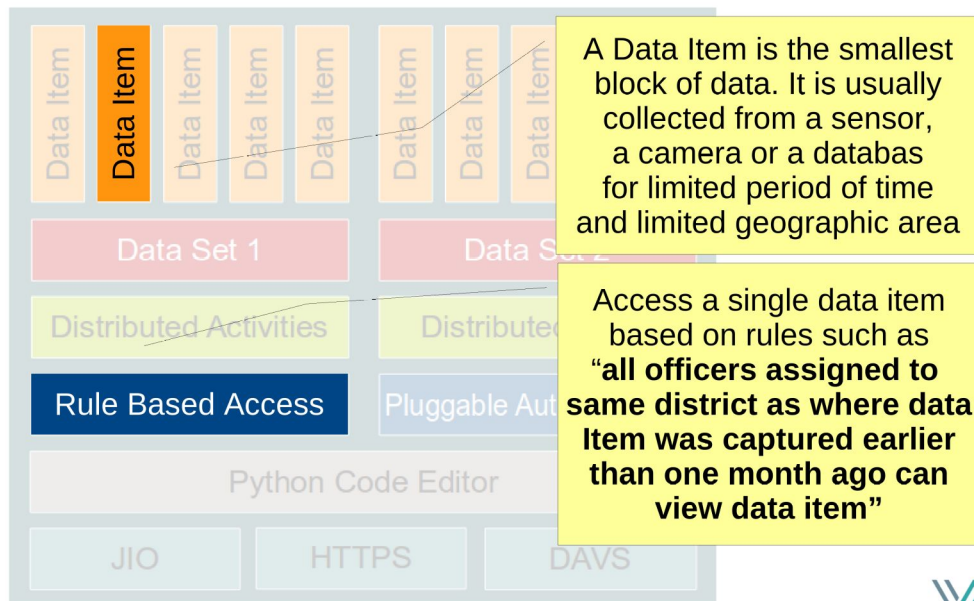
Data Encryption

I/O



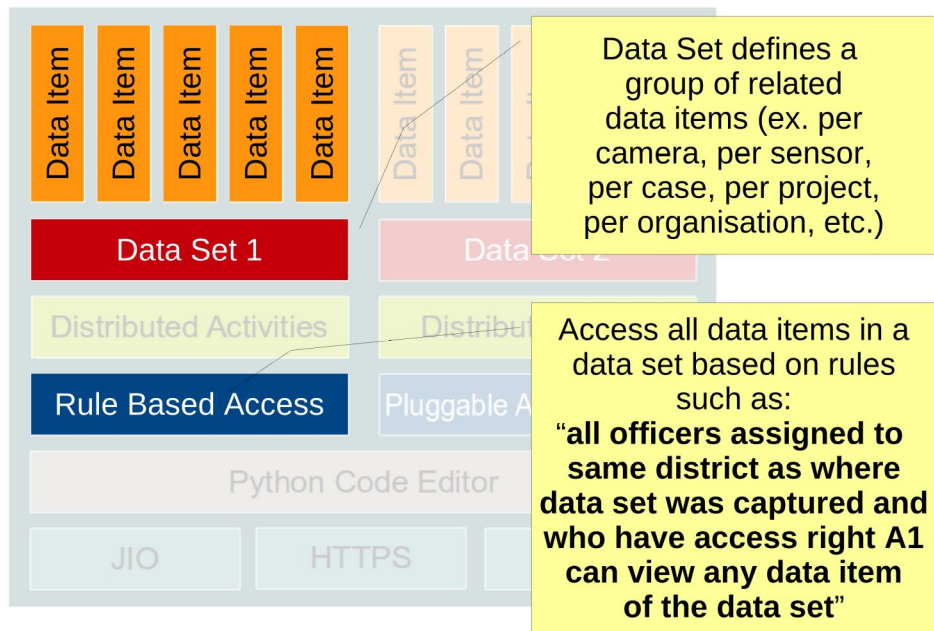
Data Access Rules

Data Item



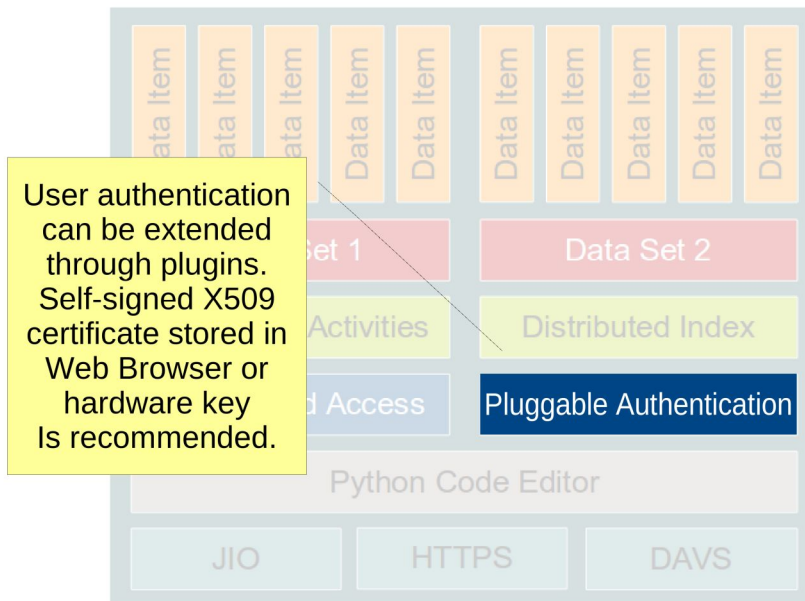
Data Access Rules

Data Set



User Authentication

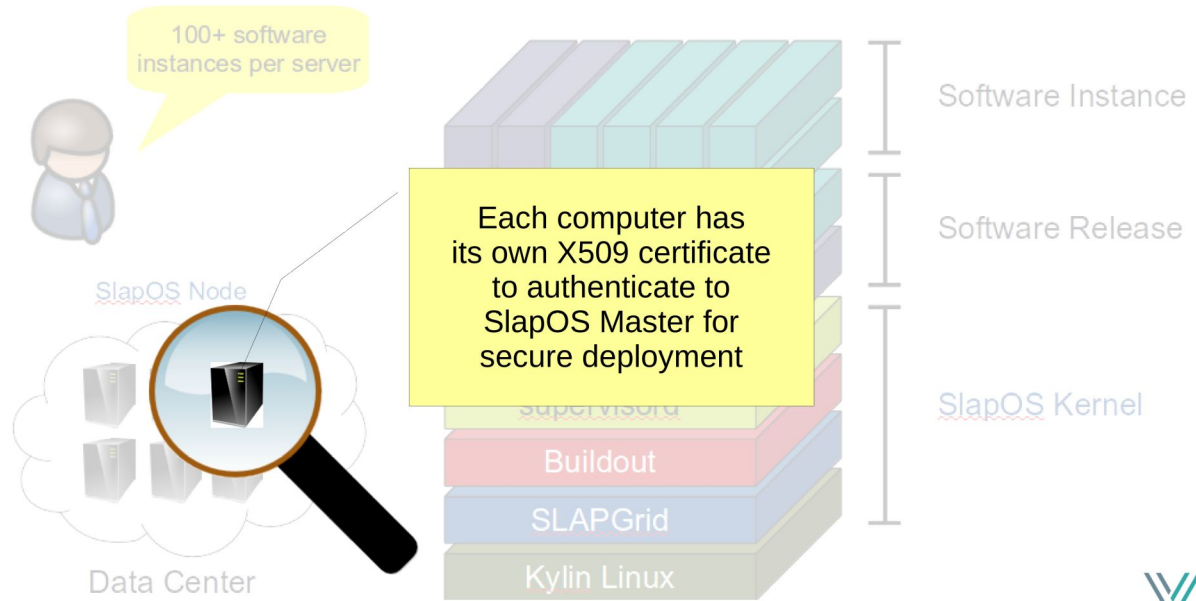
X509



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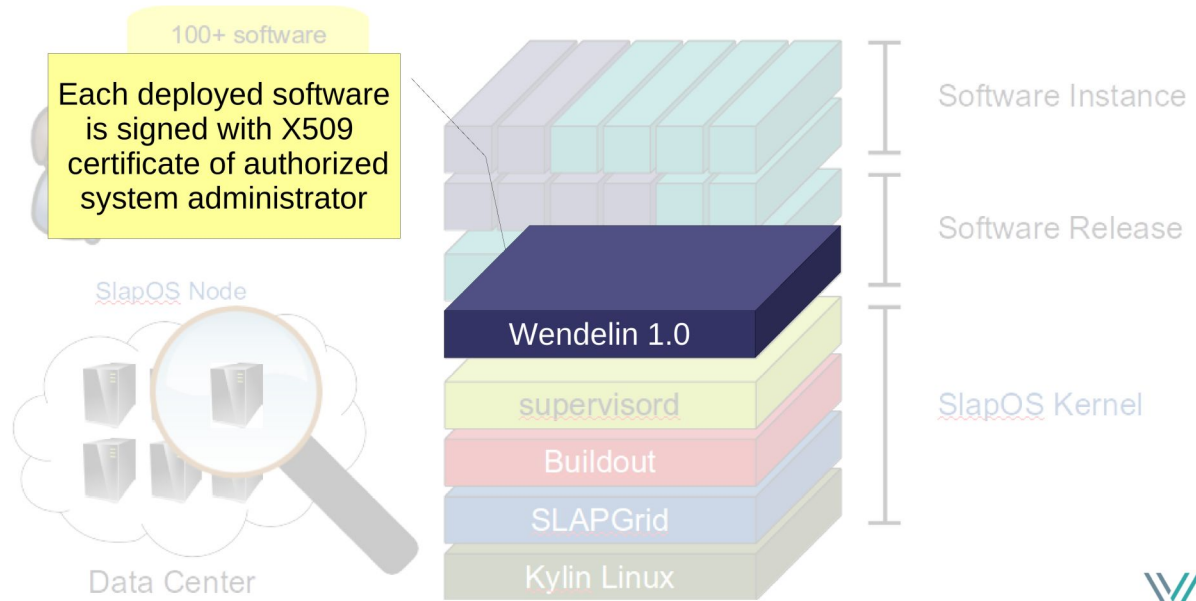
Computer Authentication

X509



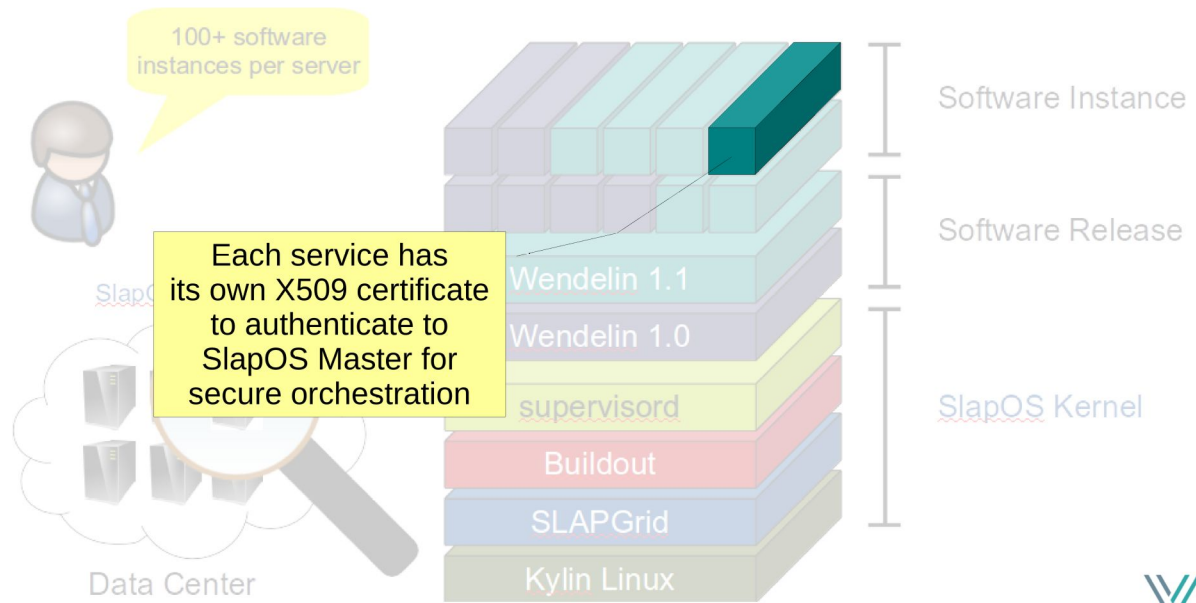
Software Authentication

X509



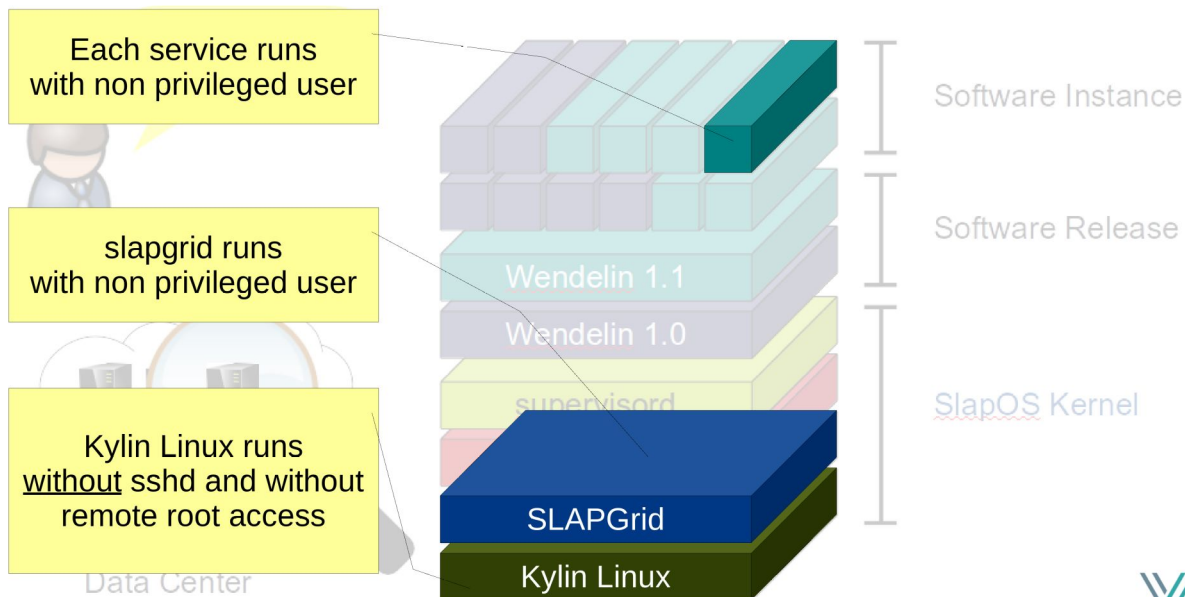
Service Authentication

X509



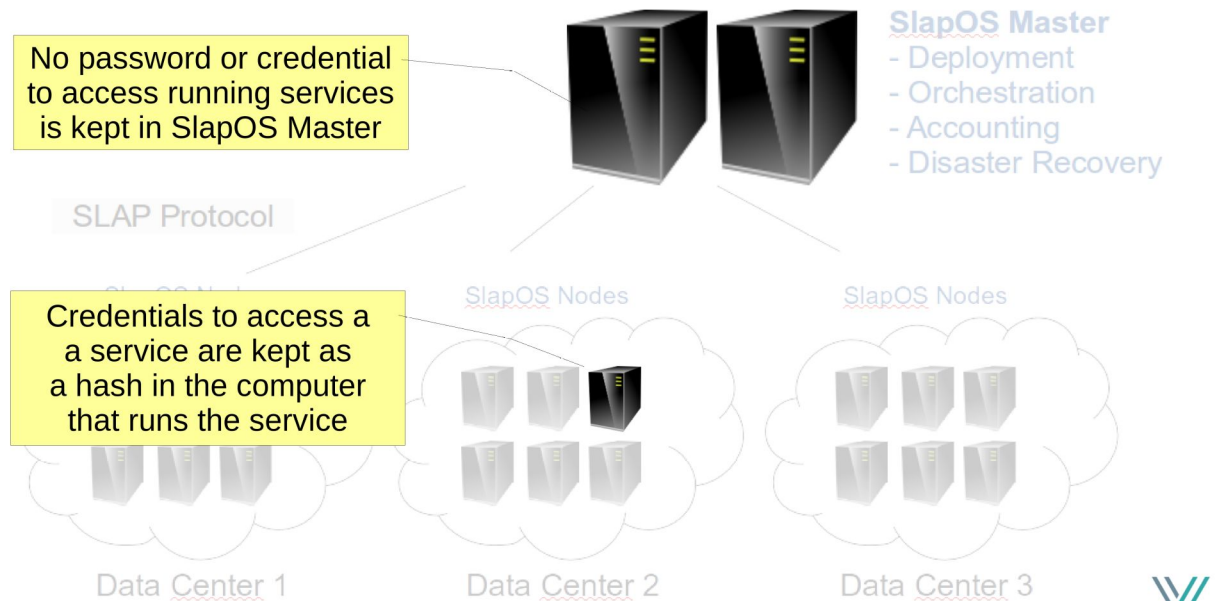
Zero Knowledge

zero root

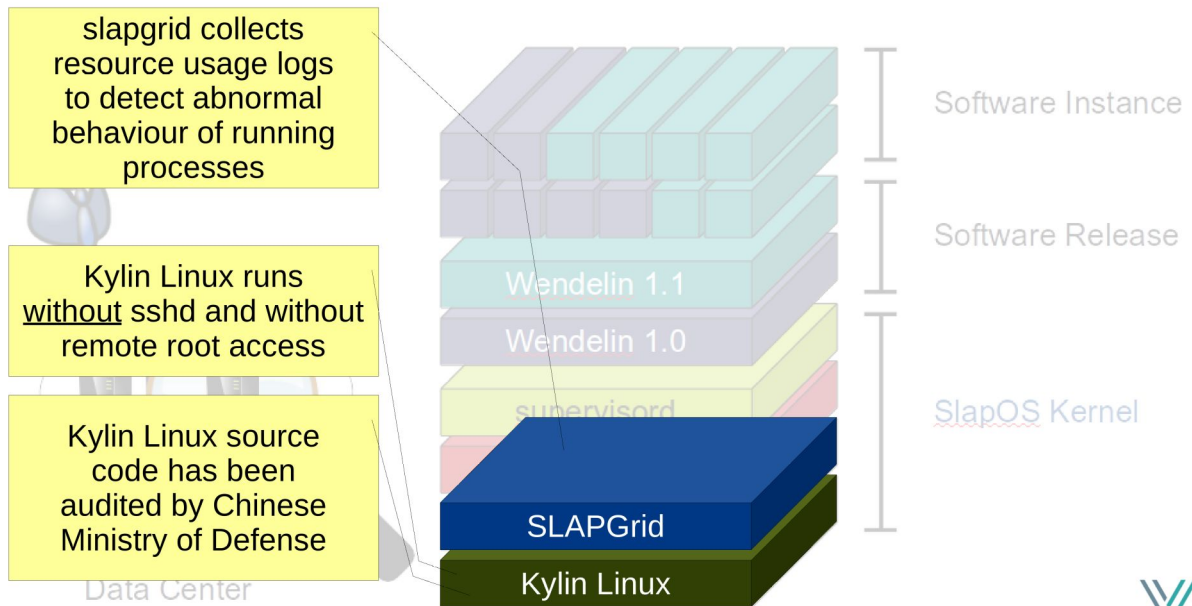


Zero Knowledge

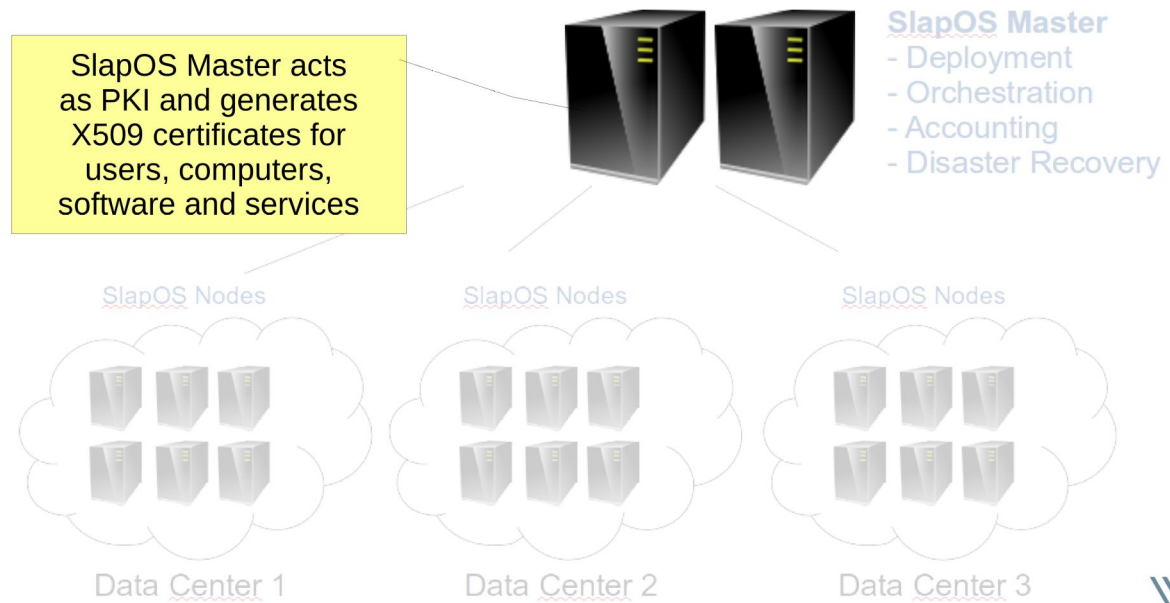
zero password



Intrusion Protection



Public Key Infrastructure (PKI)



Agenda

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Safety

Availability

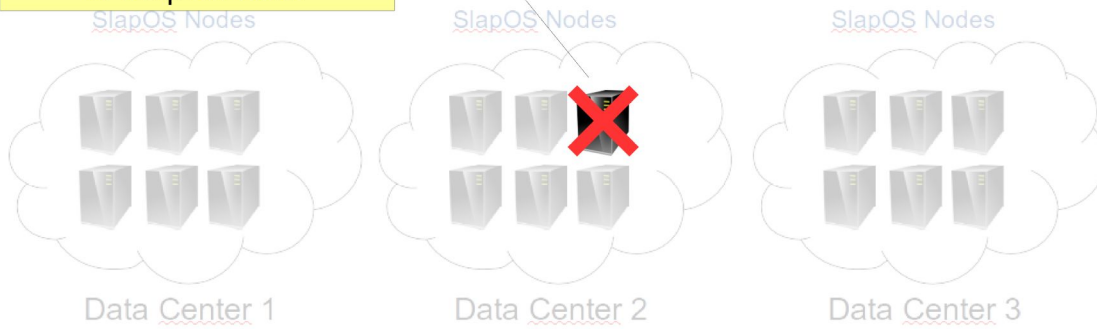
SlapOS

System remains available in case of unavailability of SlapOS master

System remains available in case of unavailability of SlapOS node

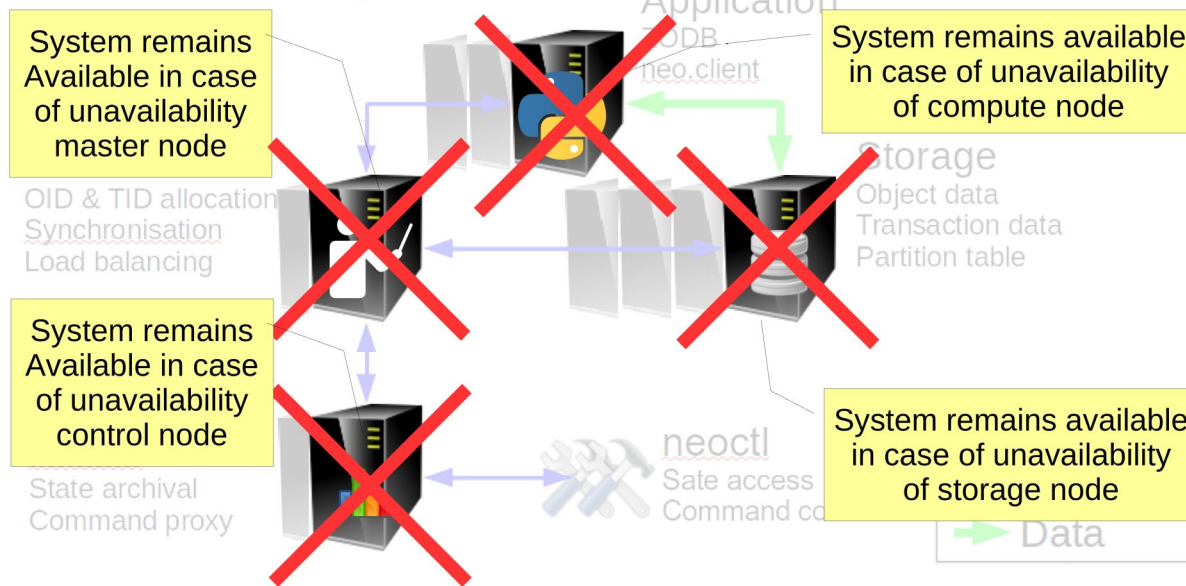


- SlapOS Master**
- Deployment
 - Orchestration
 - Accounting
 - Disaster Recovery



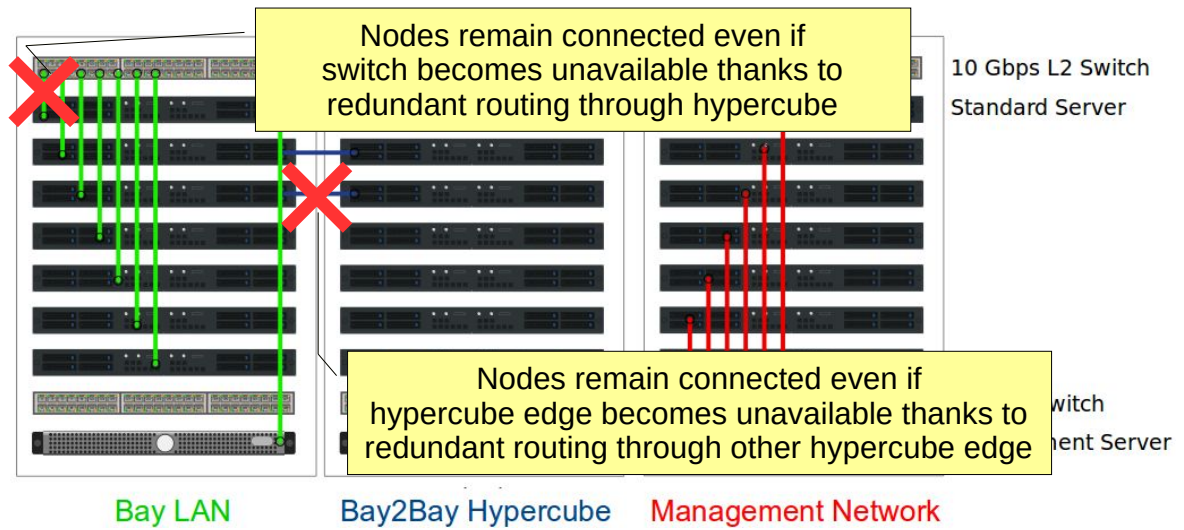
Availability

NEO



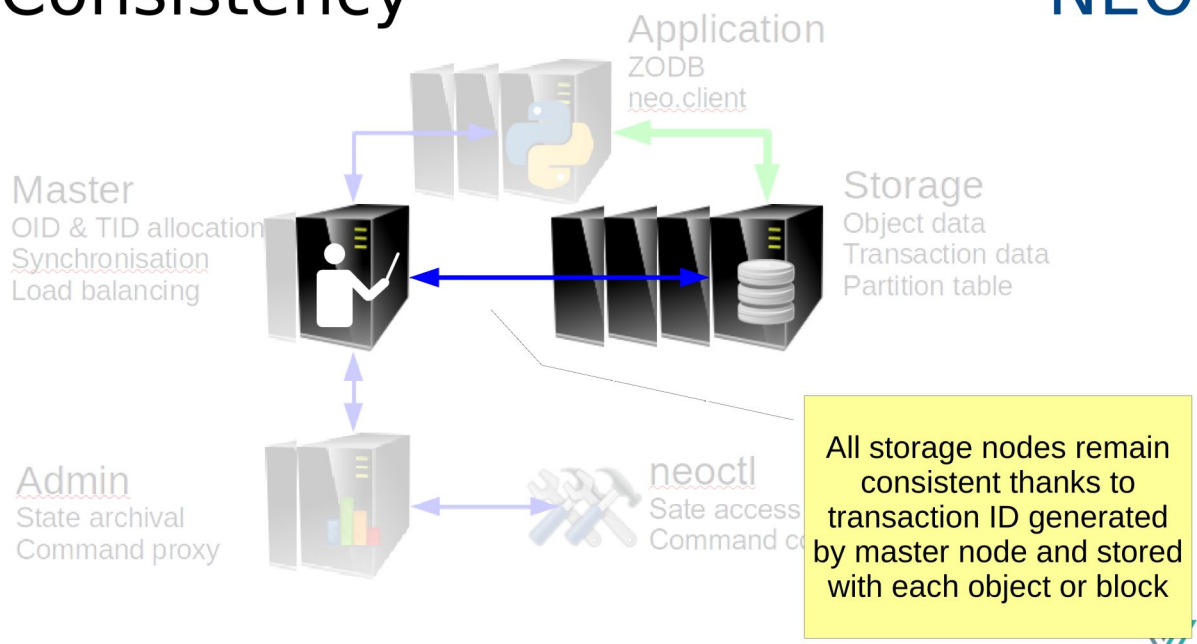
Availability

LAN



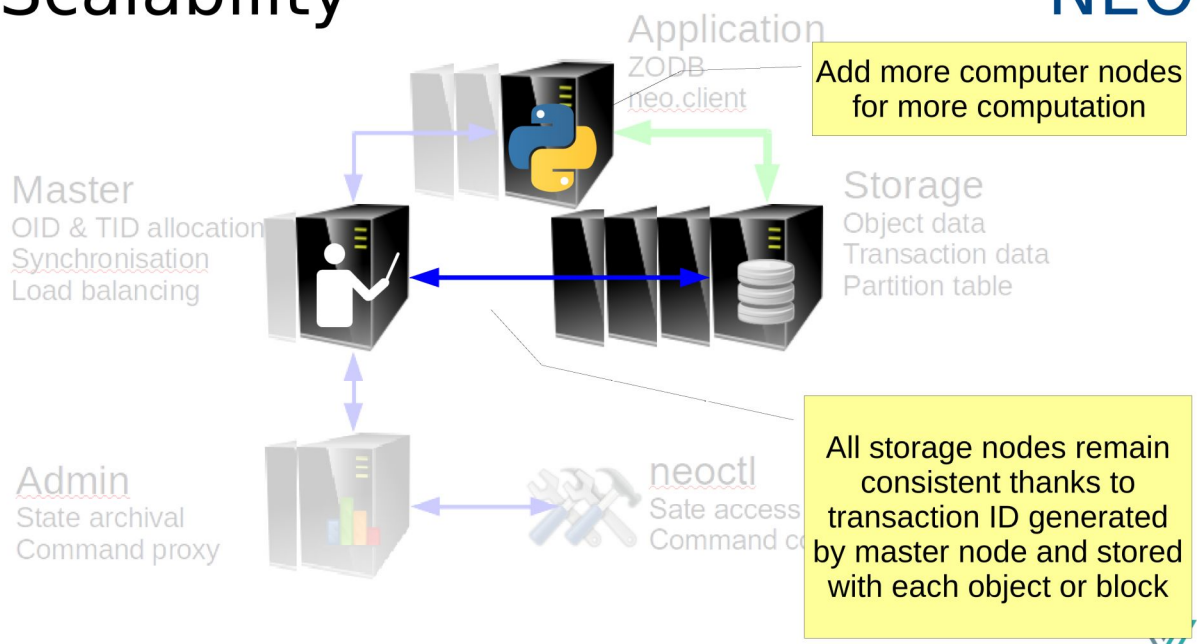
Consistency

NEO



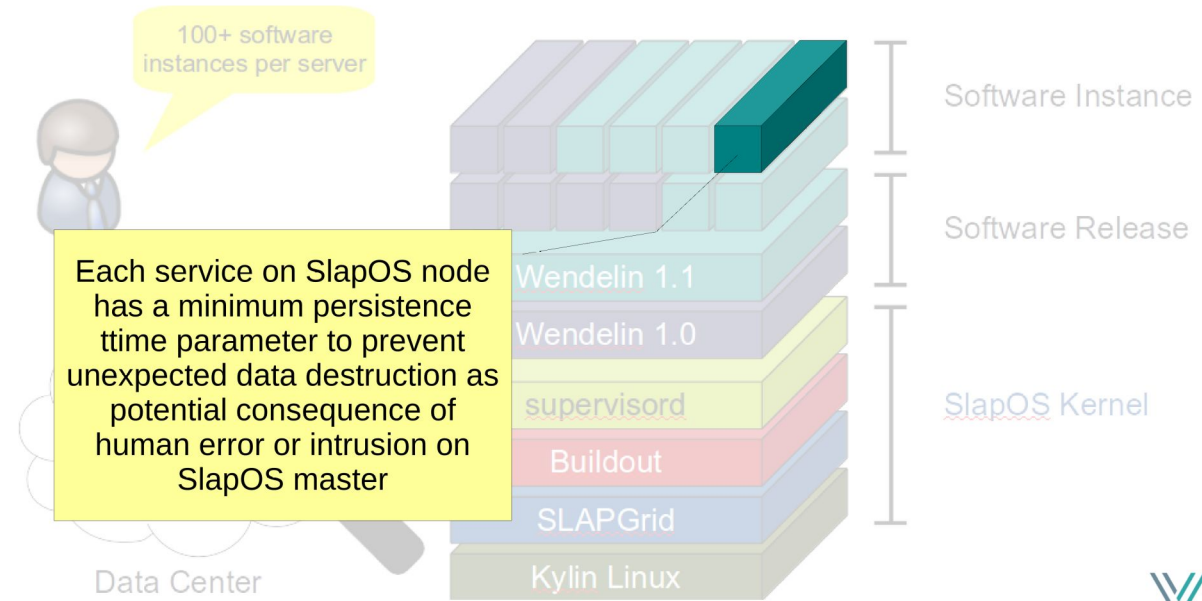
Scalability

NEO



Persistence

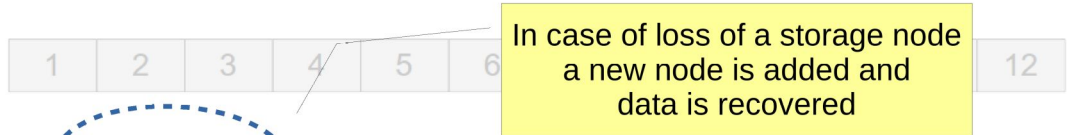
SlapOS



Disaster Recovery

Storage

neo.ndarray



Disaster Recovery

Datacenter

