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# Security Challenges in the Cloud

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7.2. Darmstadt, Conference of the e-Finance Lab

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# Outline

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1. Cloud Security Issues
2. Cloud Security Solutions
  - Mitigate Risks & Take Opportunities
3. Take Home Message

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## 1. Cloud Security Issues

## 2. Cloud Security Solutions

Mitigate Risks & Take Opportunities

## 3. Take Home Message

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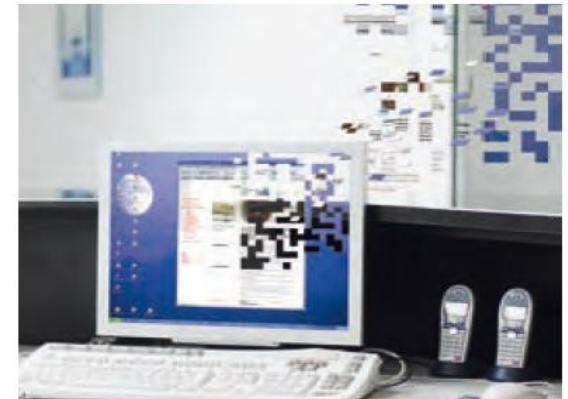
# 1 Cloud Security Issues

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**Well-known Hot Topics:** CSA 2010, ENISA 2009, IBM X-Force 2010, CSOs

- Loss of Control, Compliance & Data Leakages

- Where is my data?
- Who accesses my data?
- Strong isolation for multiple tenants?
- How is data backup handled?



**Required:** Security monitoring of applications

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# 1. Cloud Security Issues

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## Well-known Hot Topics (cont.)

- **Bring your Own Device:** Smart Phones etc.
  - Insecure personal devices:  
Patch-level? Anti-virus checks? Theft protection?
- Backup of sensitive data on device
- Access to Cloud-data via stolen, misused mobile devices



**Required:** Security 'health' checks for mobiles

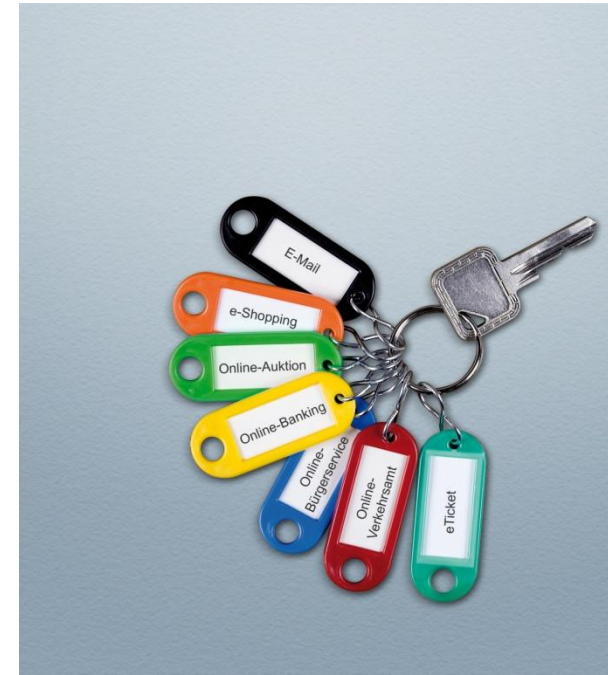
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# 1. Cloud Security Issues

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## Well-known Hot Topics (cont.)

- Identity & Access Management
  - Federated Clouds: Single-Sign-in?  
SAML and RBAC supported?  
Strong Authentication, e.g. nPA?
  - Trustworthiness of used Clouds?  
Certification? Trust-Labels?



**Required:** Security assessments for platforms

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# 1. Cloud Security Issues

## Security Challenge in the Cloud

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**Challenge:** Turn fear and doubt into trust and added-value!

Turn Cloud Computing into a Security Enhancing Technology!

- Provide **Security Monitoring Tools** to enhance trust in Cloud platforms.
- Provide Cloud-based **Security as a Service** Solutions to support mobile cloud access.
- Provide usable, **secure Cloud Services** to enhance security in daily business scenarios

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# Outline

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## 1. Cloud Security Issues

## 2. Cloud Security Solutions

Lots of Paper Work, Guidelines already available:

- Cloud Security Alliance, NIST, BSI, ENISA, etc.

Security technologies are evolving

- **Mitigate Risks:** Cloud Monitoring
- **Take Opportunities:** Security aaS

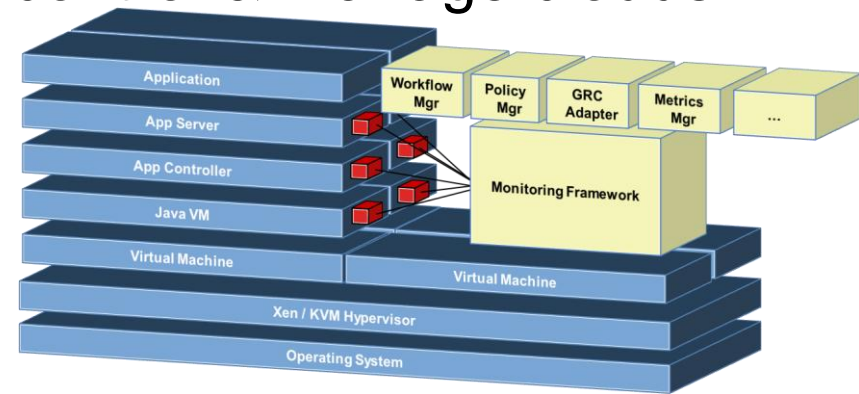
## 2. Cloud Security Solutions

### Mitigate Risks: **AISEC Cloud Leitstand**

Leitstand: **Security Monitoring Framework**

**Aim:** Empower users/providers to control & manage clouds

- Enforcement of policies  
e.g. access control, authorization
- Monitoring of platform metrics:  
e.g. time-to-patch, network traffic, ...
- Dashboard displays role-specific information
- Plug in existing monitoring tools: e.g. Zabbix, Ganglia, RSA Archer
- Prototype: commercial (e.g. Vblock) & open source (e.g. OpenNebula)



## 2. Cloud Security Solutions

### Mitigate Risks: AISEC Cloud Leitstand

#### ■ Data on different layers

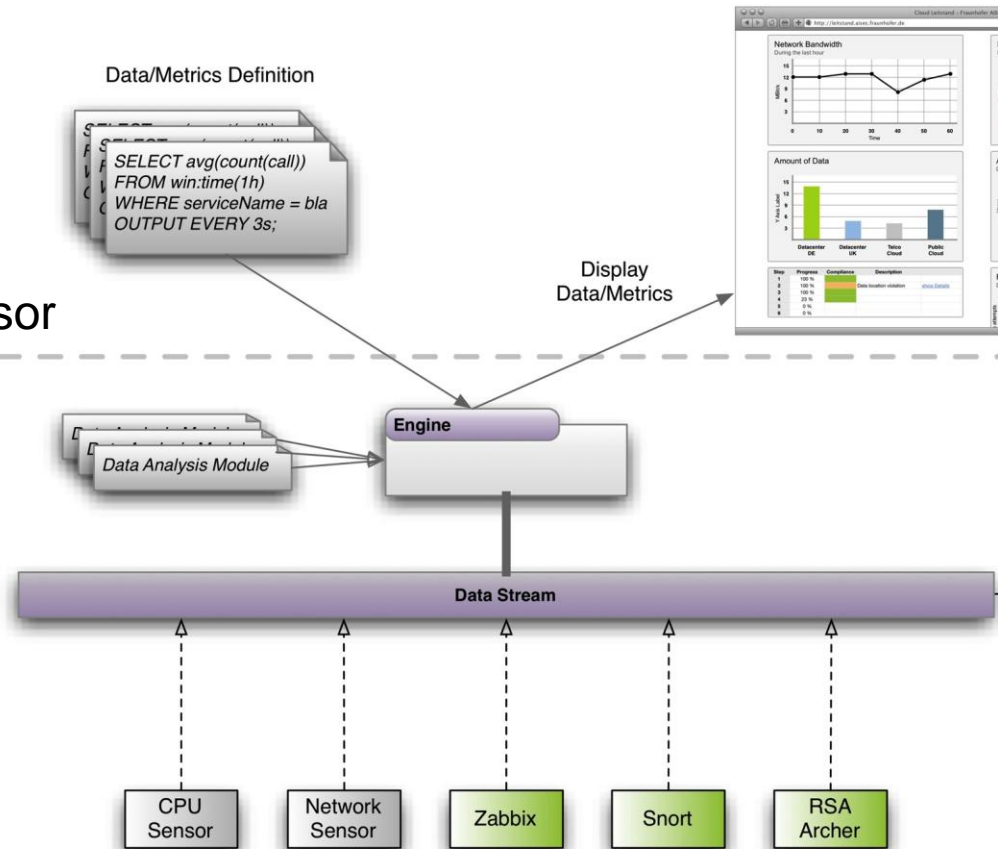
- SOAP calls
- Method calls In Java-VM
- System calls in guest OS/Hypervisor

#### ■ Dashboard

- Role-specific views
- Services to analyze incidents

#### ■ Backend

- Integration of monitoring tools



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## 2. Cloud Security Solutions

### Mitigate Risks: **Sealed Cloud**

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Sealed Cloud: **Provider-secure Cloud**, BMWi funded project

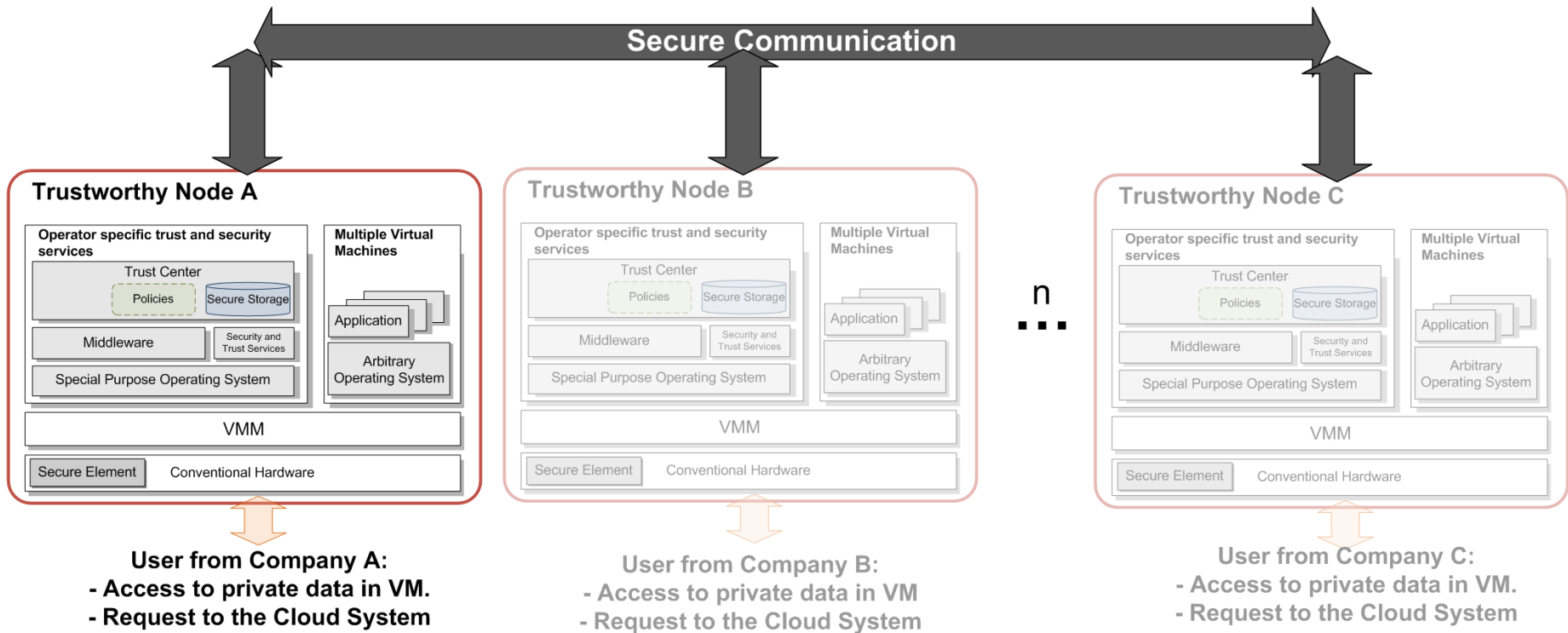
**Aim:** leverage the Trust Level of Cloud Infrastructure provider

- Integrate data protection mechanisms to provide a secure and technically verifiable infrastructure
  - Integrating **Hardware Security Modules** & end-to-end – encryption
  - Integrating **attestation techniques** & software integrity monitoring
- Providing strong Authentication: Gateway for Identity tokens (nPA, OpenID...), SAML, eCard-Server-Interface
- Data cleanup services, diskless systems

# 2. Cloud Security Solutions

## Mitigate Risks: Sealed Cloud

Architecture of a Trusted Cloud System



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## 2. Cloud Security Solutions

### Take Opportunities: **Security as a Service**

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#### **Problem:**

Bring your own (insecure!) device

Solution: **Cloud-based Security aaS**

- Anti-virus scanning
- OS integrity checks
- Malicious App Prevention
- Secure Storage
- Wiping and versioning



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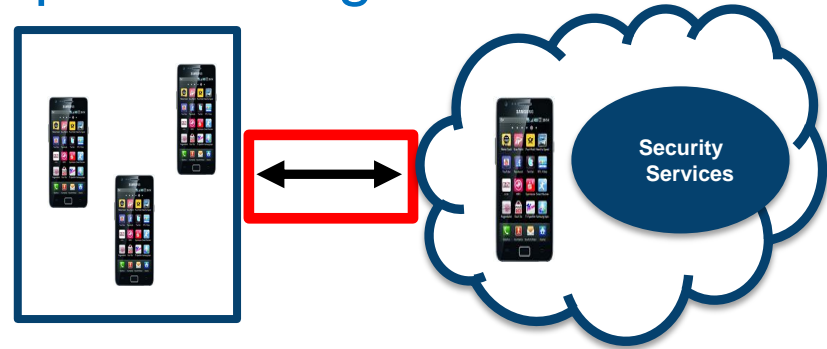
## 2. Cloud Security Solutions

### Take Opportunities: **Security as a Service**

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Services: **Analyze replicated Smartphone Image**

**Aim:** synchronize in near real-time,  
save battery consumption, CPU,  
network bandwidth etc.



#### Set-up

- Amazon Web Services on Linux OS
- **Run Emulation** of a Smartphone in VM
- Adapted Emulator to **dump Smartphone Images**

#### Security as a Services:

- **AVG anti-virus** : takes 7 sec in Cloud versus 50 sec on device
- Use Private Cloud **to enforce Security Policies** on mobile Phones

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## 2. Cloud Security Solutions

### Take Opportunities: Tap 'n' Drop

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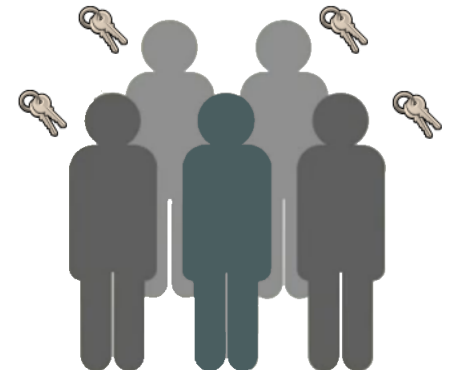
#### Problem:

- Ad-hoc sharing of documents during e.g. meetings: secure, comfortable, synchronized, ...



#### Possible Solutions:

- Pass around an **USB stick**
  - Are you sure there is no virus on it?
- Send an **encrypted email** to everybody
  - Is everybody using S/MIME? Or PGP?
- Use an online storage like **DropBox**
  - Everybody needs an account
  - Everybody needs to trust the storage provider



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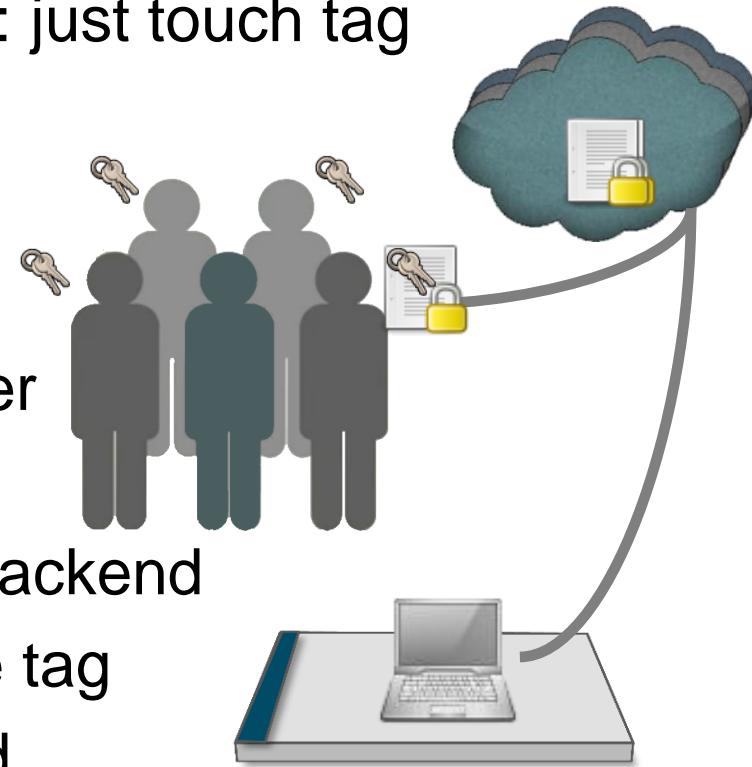
## 2. Cloud Security Solutions

### Take Opportunities: Tap 'n' Drop

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Tap ,n' Drop: Secure ad-hoc sharing of files using CC

- **NFC enabled** smartphone or laptop: just touch tag
- Ad hoc creation of a **Cloud storage**
- On-the-fly generation & distribution of encryption **keys**
- **Instant access** to shared online folder
- It's secure and it's easy:
  - **Client-site encryption**, no trusted backend
  - No-click-interaction: **Just touch** the tag
  - **No set up** or configuration required



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# Outline

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- 3. Take Home Message**

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## 3. Take Home Message

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Challenge: Turn fear and doubt into trust and added value!

Turn Cloud Computing into a Security Enhancing Technology!

- Enhance trust in cloud offerings by providing means to control what is going on (Lenin: Vertraue, aber prüfe nach)  
e.g. **Cloud Leitstand (Monitoring Framework)**
- Enhance Security by offering Security as a Service using cloud technology  
e.g. **Tap 'n' Drop, BringYourOwnDevice**

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# Thank you for your Attention

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