# ABAC AND THE EVOLUTION OF ACCESS CONTROL MODEL

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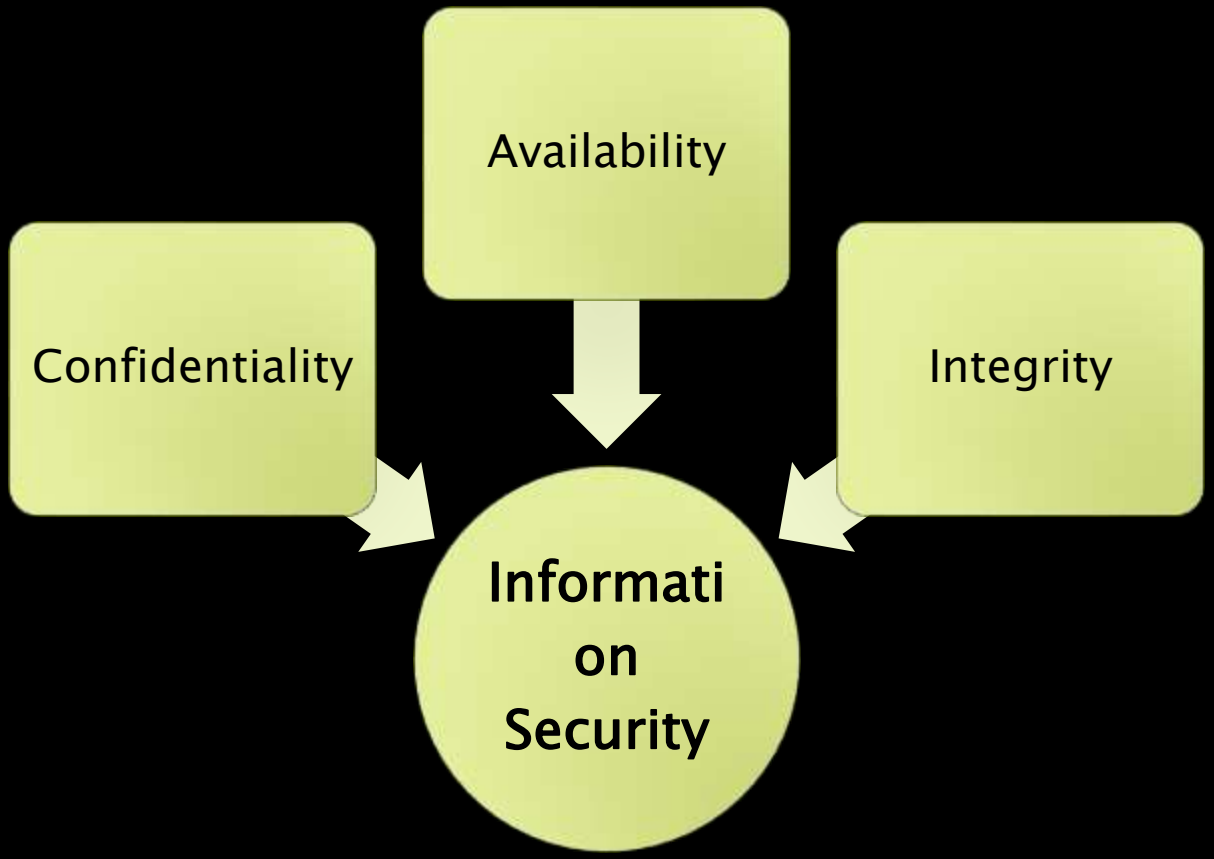
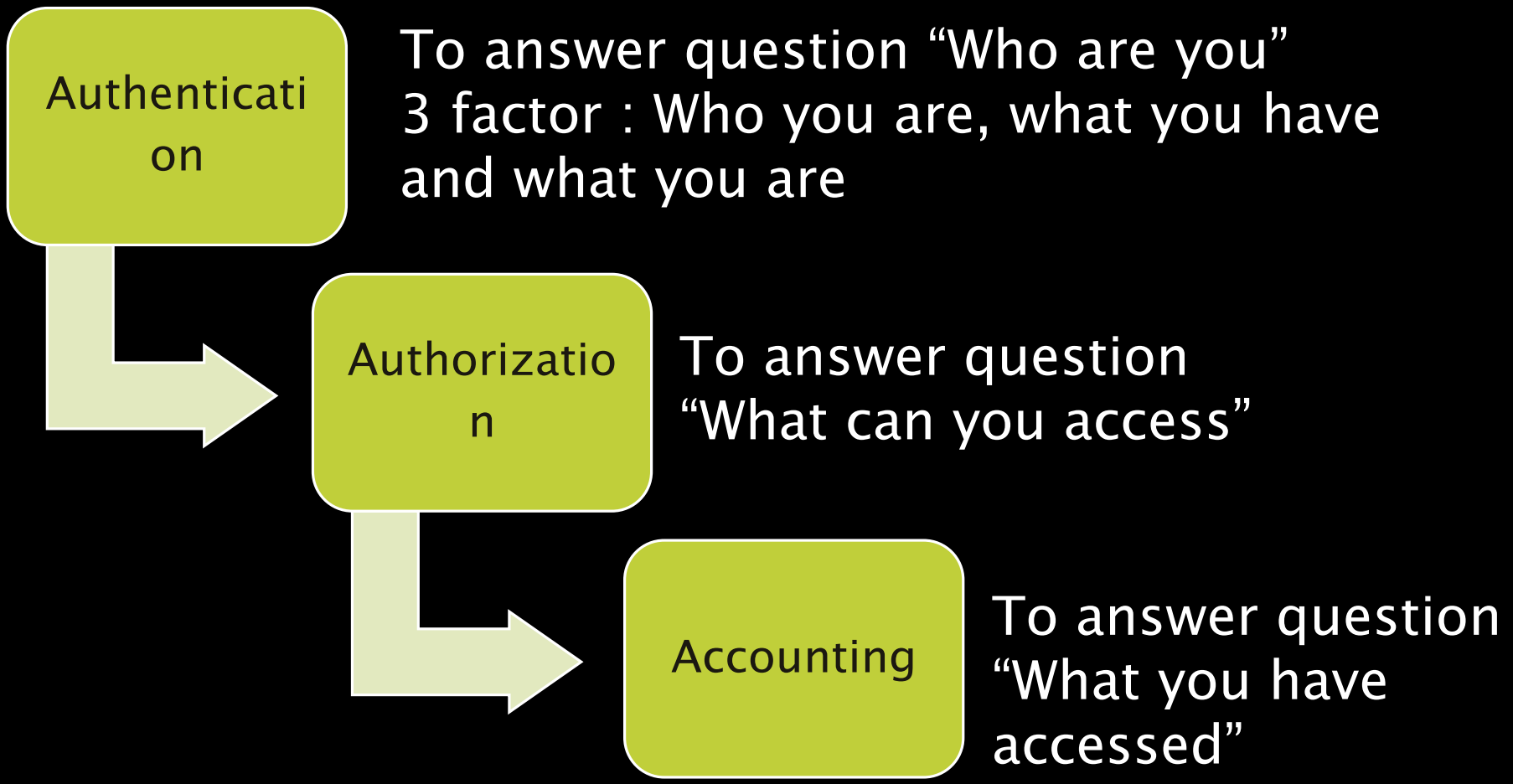
# INFORMATION SECURITY



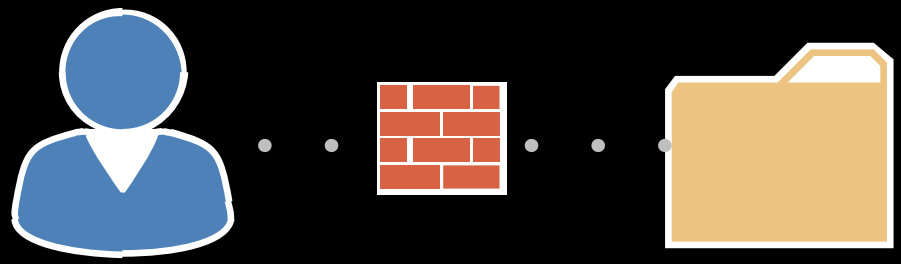
# AAA


Authenticati
on
To answer question “Who are you”
3 factor : Who you are, what you have and what you are
Authorizatio
n
To answer question
“What can you access”
Accounting
To answer question
“What you have accessed”

# Let’s talk about Access Con

# ACCESS CONTROL MECHANISM

*"The logical component that serves to receive the access request from the subject, to decide, and to enforce the access decision."*



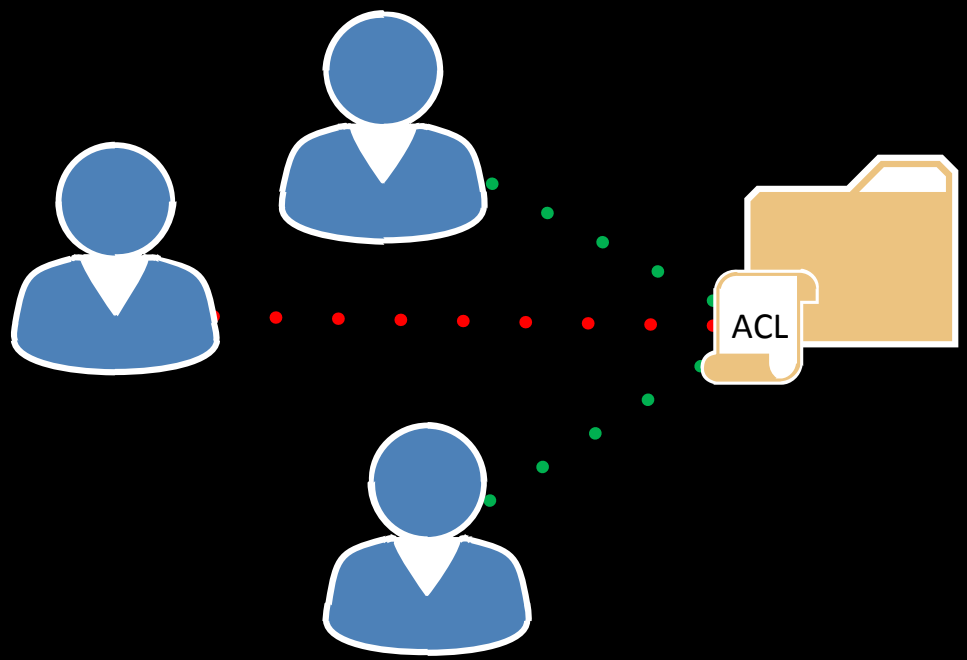
# ACCESS CONTROL MODEL

*"Framework that dictates how Subjects Access Object."*

– CISSP AIO Exam Guide, 6th Edition

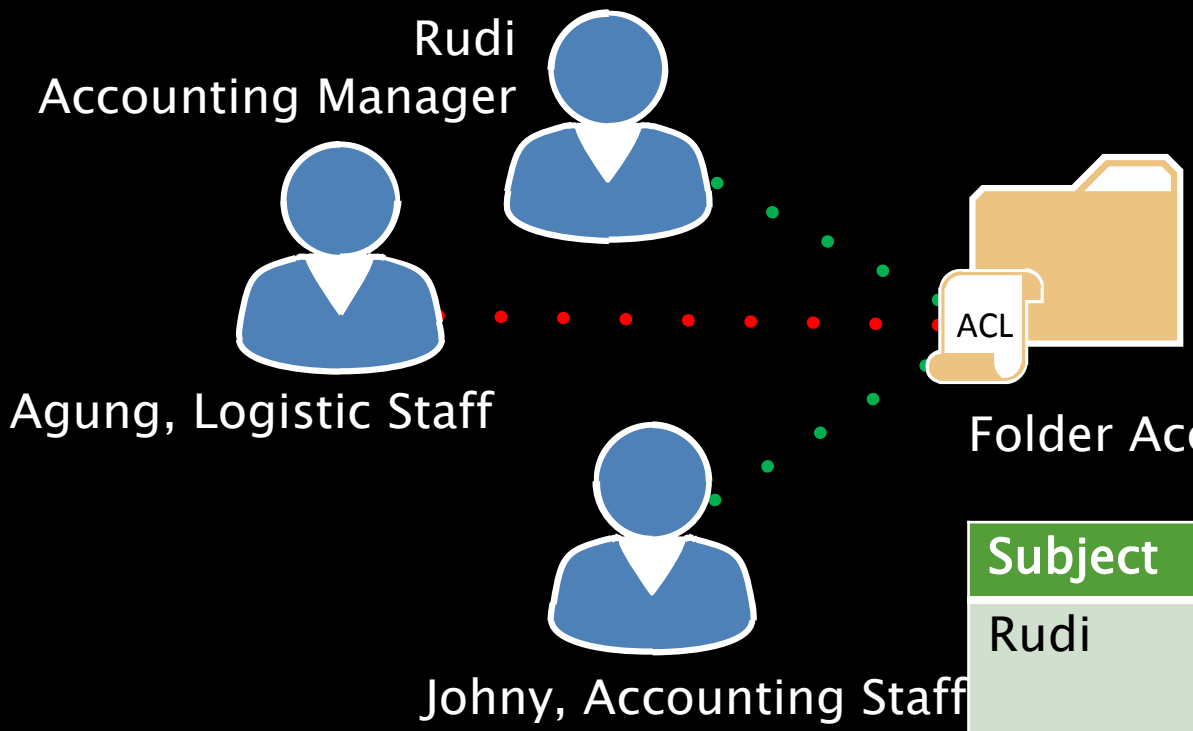

# ACCESS CONTROL MODEL

# DISCRETIONARY ACCESS CONTROL (DAC)




- Decentralized
- Owner Discretion, usually via administrator
- Enforce through ACL
- Identity Based
- Permission rule attached to the Object

# DISCRETIONARY ACCESS CONTROL (DAC)



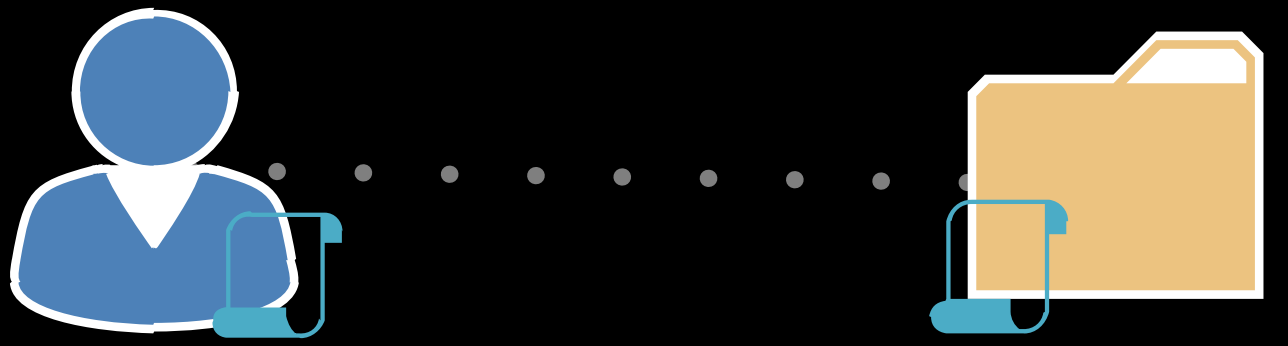

| Subject | Permission |
|---|---|
| Rudi | Full Control |
| Johny | R W D C |

# DISCRETIONARY ACCESS CONTROL (DAC)

| Pros | Cons |
| --- | --- |
| • Easy to implement<br>• Great Flexibility<br>• Built-in in most OS | • Doesn't scale well<br>• Possibility of ACL Explosion<br>• Prone for mistakes |


# ACCESS CONTROL MODEL

# MANDATORY ACCESS CONTROL (MAC)

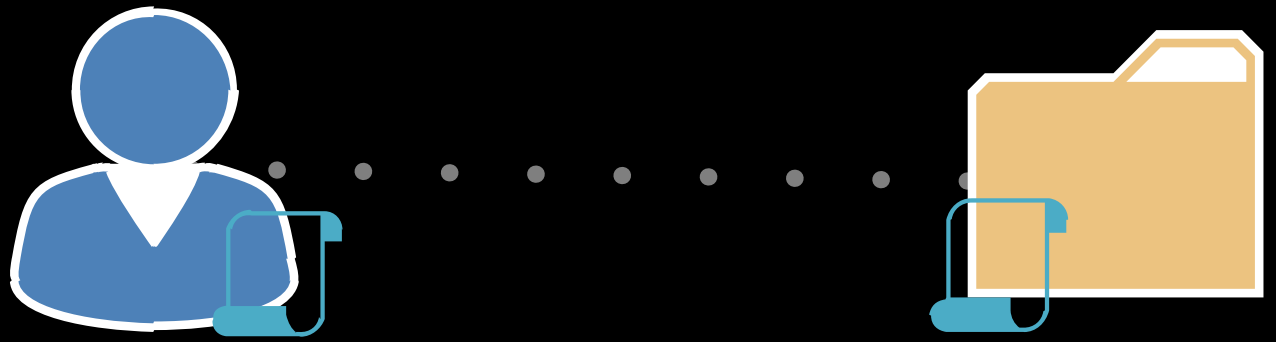


Subject with Clearance

Object with Classification

- Centralized
- Access Control enforced with Clearance and Classification
- Only Subject with Clearance the same or above from Object Classification can Access the Object

# MANDATORY ACCESS CONTROL (MAC)



Ken Watanabe, Intelligent Analysis
Clearance Level 2

Project Pegasus
Data Classification Top Secret

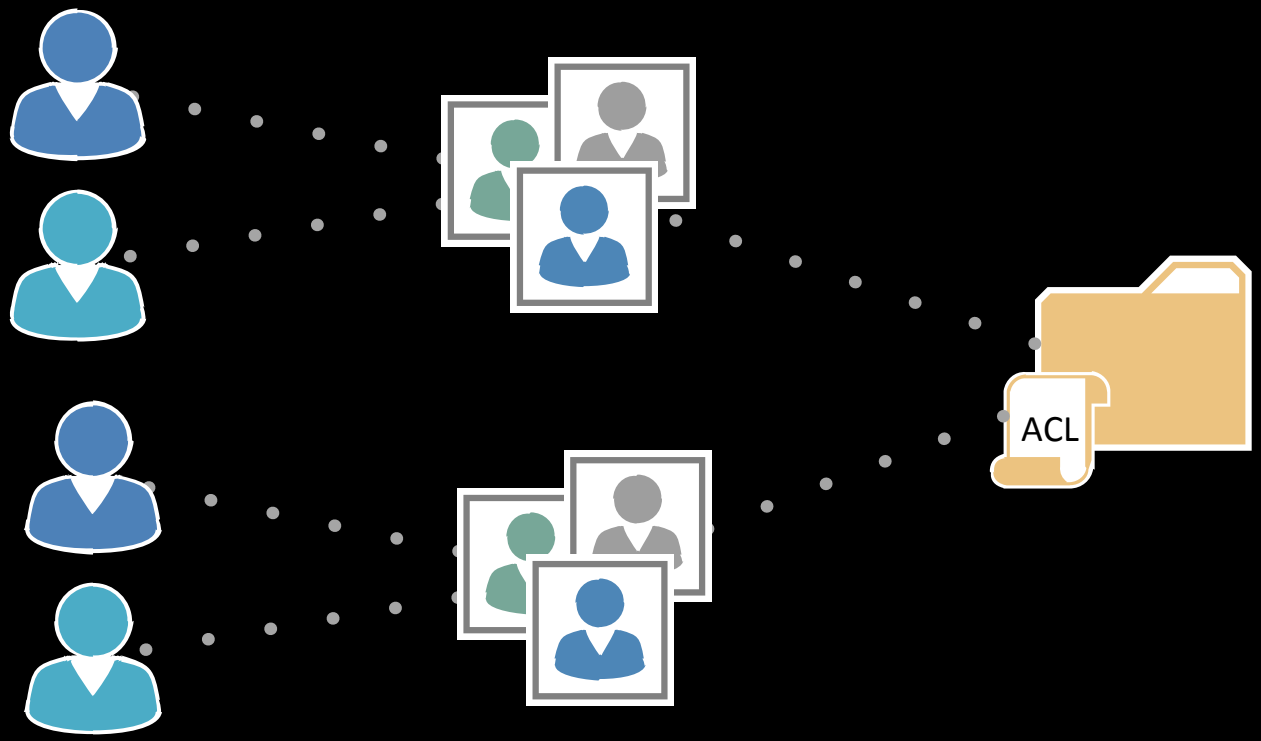
| Clearance Level | Classification |
|---|---|
| Level 5 | Top Secret, Secret, Classified, UnClassified |
| Level 4 | Secret, Classified, UnClassified |
| Level 3 | Classified, UnClassified |
| Level 2 | UnClassified |

# MANDATORY ACCESS CONTROL (MAC)

| Pros | Cons |
| --- | --- |
| • Most Secure<br>• Easy to scale | • Not Flexible<br>• Limited user functionality<br>• High admin overhead<br>• Expensive |


# ACCESS CONTROL MODEL

# ROLE BASED ACCESS CONTROL (RBAC)

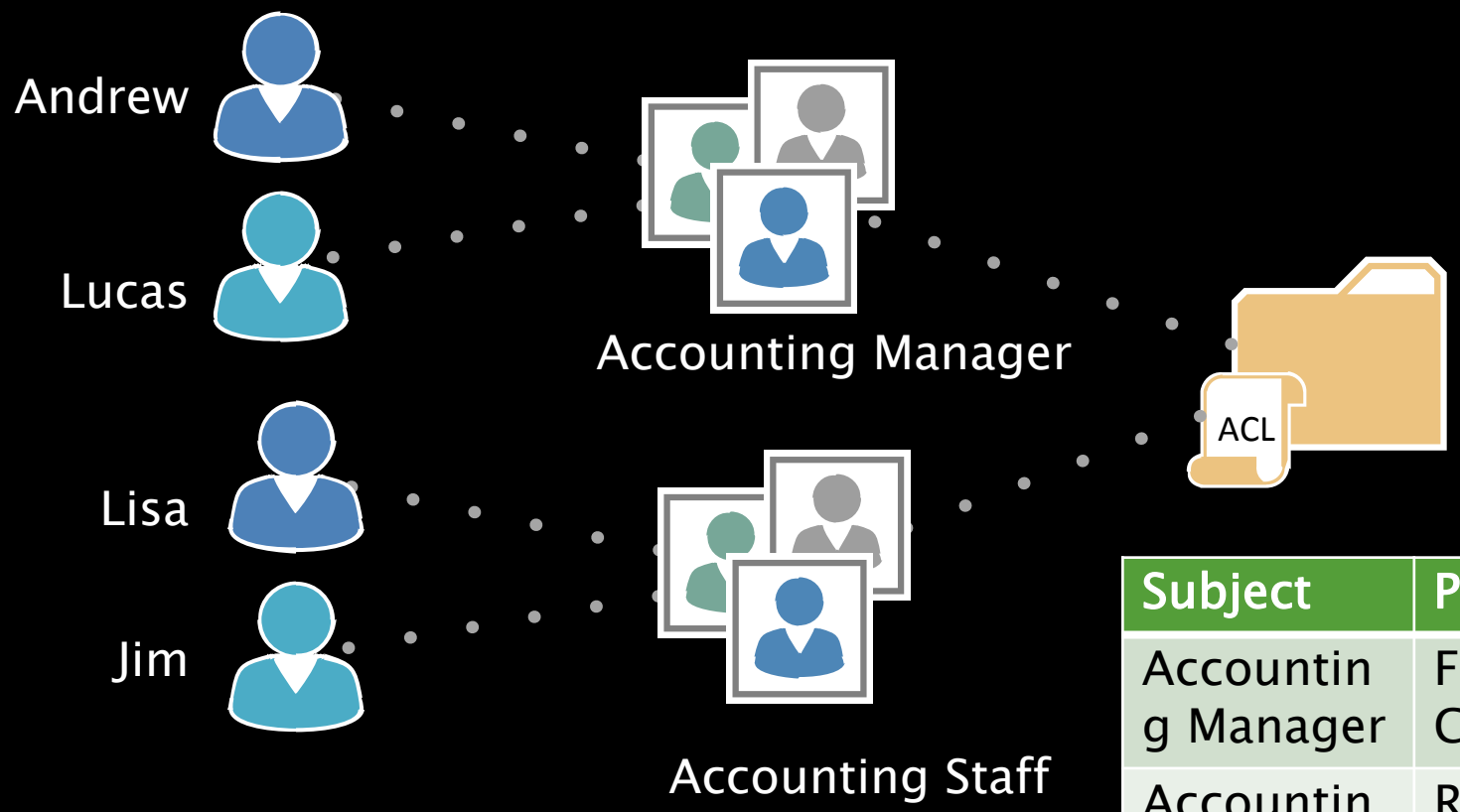



Subject Assigned to Role

Role

Object with ACL for Role

# ROLE BASED ACCESS CONTROL (RBAC)




| Subject | Permission |
|---|---|
| Accounting Manager | Full Control |
| Accounting Staff | R W D C |

# ROLE BASED ACCESS CONTROL (RBAC)

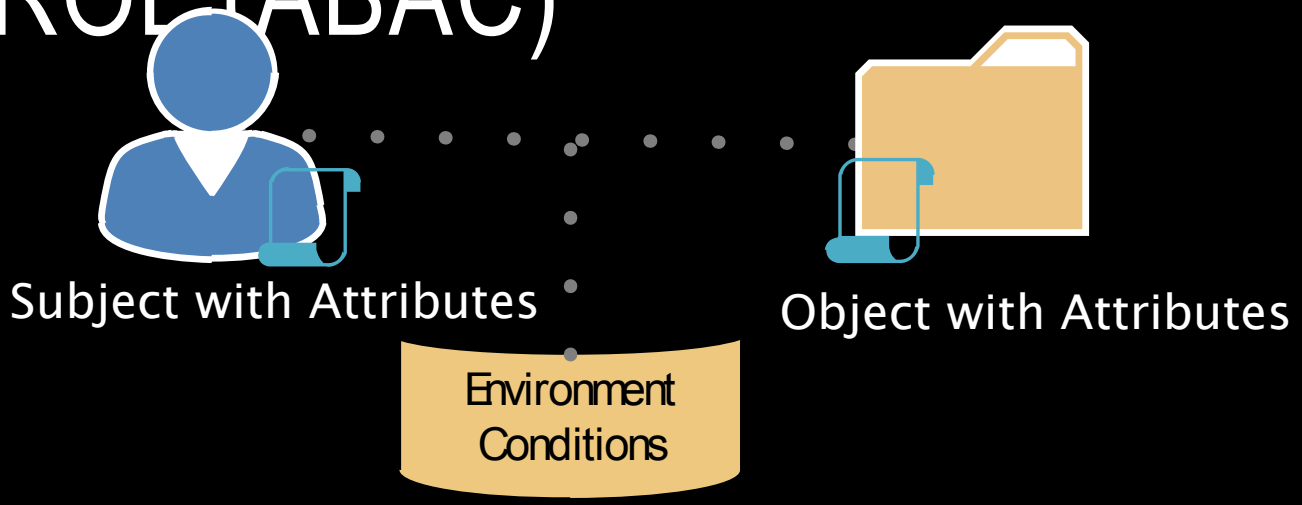
- Centralized and Decentralized at once
- Subject access permission are enforced through Role membership
- Role permissions are enforced through Object's ACL
- Subject can be a member of more than one role

# ROLE BASED ACCESS CONTROL (RBAC)

| Pros | Cons |
| --- | --- |
| • Scalable to some degree<br>• Great for organizations with high turn over | • Roles needs provisioning and maintenance<br>• Possibility of Role explosion<br>• Unable to accommodate real-time context |

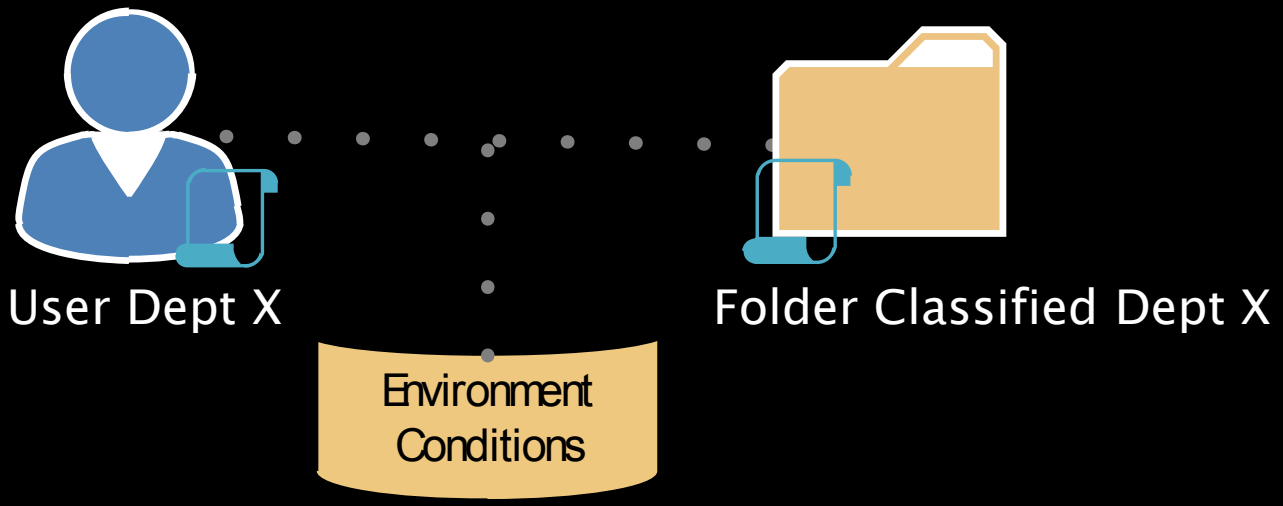

# ACCESS CONTROL MODEL

# ATTRIBUTE BASED ACCESS CONTROL (ABAC)




- Centralized
- Access Control enforced by taking Subject Attributes, Object Attributes, and Environment Context and compare them to the Policy
- Policy written using human readable language that easily understood, XACML (eXtensible Access Control

# ATTRIBUTE BASED ACCESS CONTROL (ABAC)




- Ex 1 : User can only access their Dept Folder from their own Office location at Working Hour only
- Ex 2 : Certain Folders can only be accessed from Specific Workstations if the bandwidth

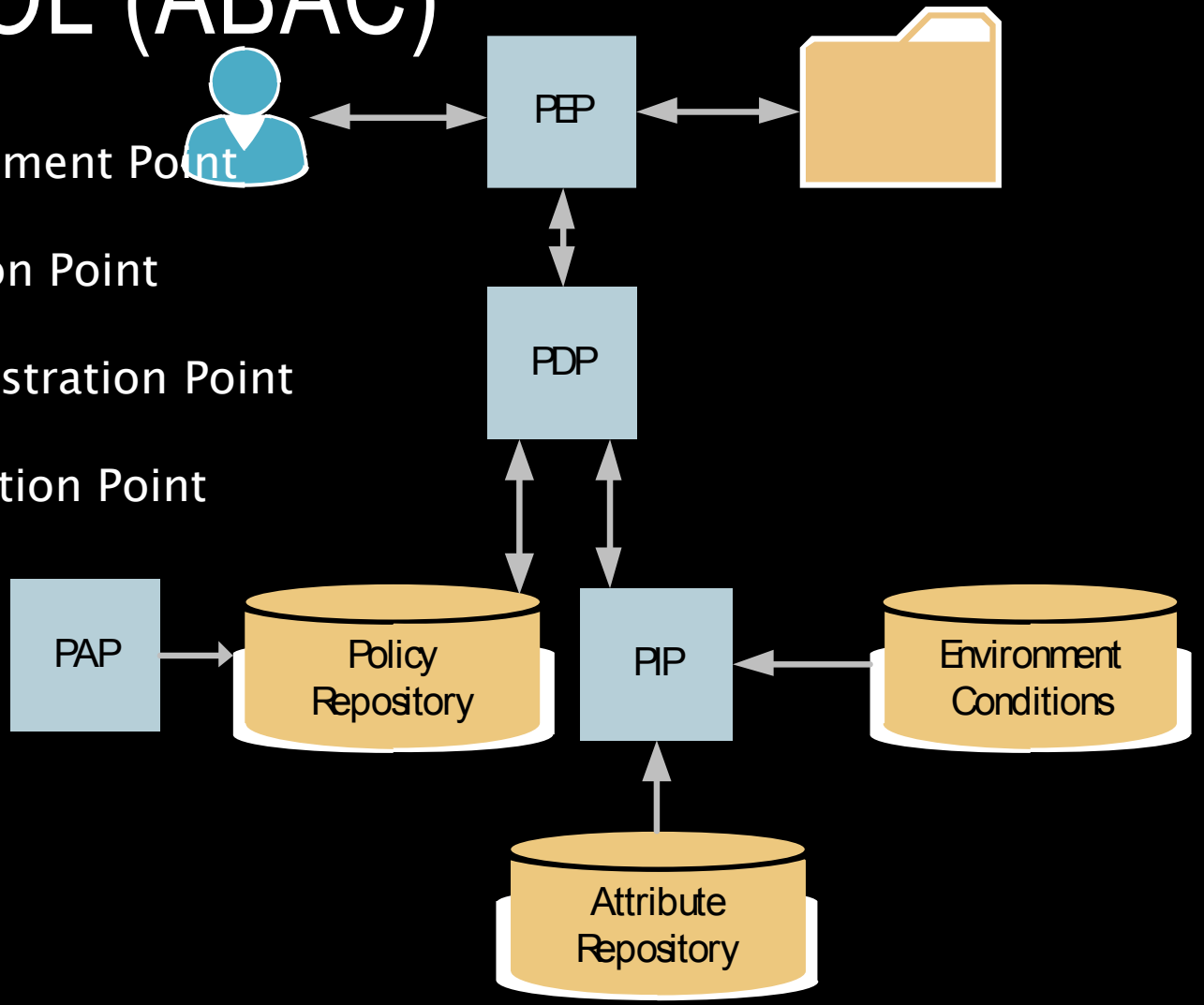
# ATTRIBUTE BASED ACCESS CONTROL (ABAC)

PEP : Policy Enforcement Point

PDP : Policy Decision Point

PAP : Policy Administration Point

PIP : Policy Information Point



# ATTRIBUTE BASED ACCESS CONTROL (ABAC)

| Pros | Cons |
| --- | --- |
| • Scalable<br>• Real time Context aware<br>• Segregation of Duty, different people can manage different Subject and Object Attributes and Policy | • It's new<br>• Requires socialization and convincing<br>• Organization change required to manage Attributes |

# ATTRIBUTE BASED ACCESS CONTROL (ABAC)

- ABAC is still in it's early stage
- Gartner predicts that by 2020 70% of business will use ABAC

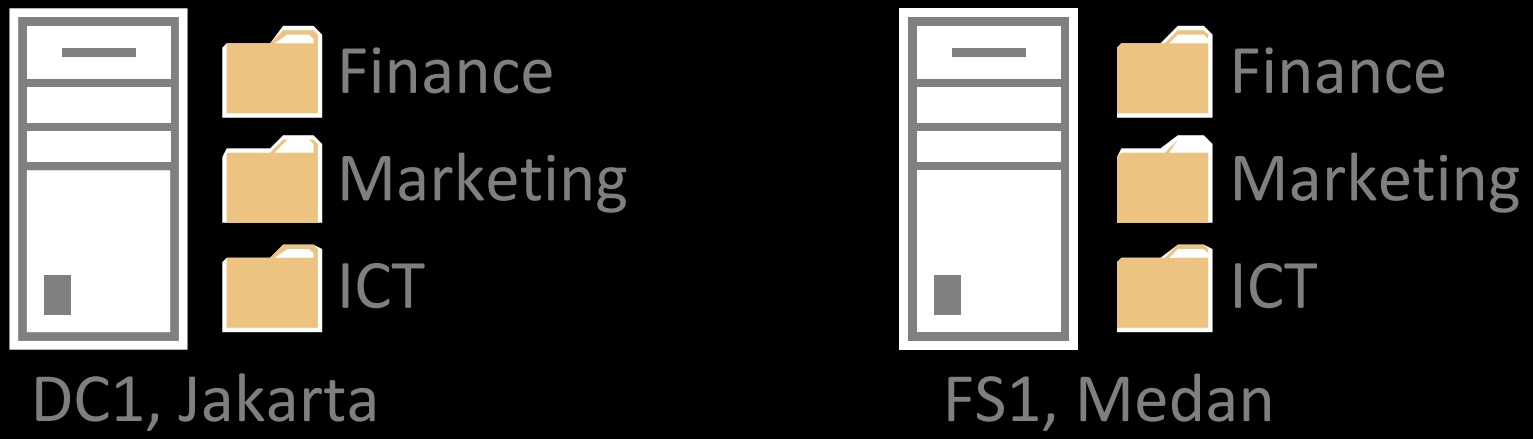
# ATTRIBUTE BASED ACCESS CONTROL (ABAC)

- Microsoft Windows Server 2012 Claim Based Access Control or Dynamic Access Control is Microsoft implementation of ABAC
- Fedora 3.3 FESL (Fedora Security Layer) using XACML to implement ABAC
- 3rd party auth service companies such as Axiomatics and Avatier offer ABAC implementation to OS and Applications and or Databases

# ATTRIBUTE BASED ACCESS CONTROL (ABAC)

- Open source ABAC projects such as :
  - http://abac.deterlab.net
  - OpenAZ, http://www.openliberty.org

# DAC SIMPLE DEMONSTRATION




| User | Attribute – Department | Attribute – st (State) |
|---|---|---|
| Andi.Michael | Finance | Jakarta |
| Bayu. Achmad | Finance | Medan |
| Ken. Surahyo | Marketing | Jakartq |
| David.Lim | Marketing | Medan |
| Zeru.Halim | Information | Jakarta |

# CONCLUSION

- The current information system ecosystem require a flexible yet secure access control and that's what ABAC is trying to answer
- As Gartner predicts, by 2020, 70% of business will use ABAC for authorization. Let's familiarize early
- There is still a lot of study required as there is no standard implementation of ABAC, therefor there is still a lot of involvement that we can offer to the Information System world

# Thank You

# Q & A

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