

# **Data and Applications Security**

## **Developments and Directions**

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**Lecture #5**

**Access Control in Data Management Systems**

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# Outline

- **Discretionary Access Control in Relational Databases**
- **Mandatory Access Control in Relational Databases**
  - Security Constraints
- **Types of Access Control**
  - Inference problem, Role-based, Temporal, Usage
- **Access Control in Other Databases**
  - Objects, Federated
- **Current Trends in Access Control**
  - Data Warehousing, Semantic Web, Privacy Control
- **Next Steps in Access Control**

# Access Control in Relational Databases: 1975 - Present

- Access Control policies were developed initially for file systems
  - E.g., Read/write policies for files
- Access control in databases started with the work in System R and Ingres Projects
  - Access Control rules were defined for databases, relations, tuples, attributes and elements
  - SQL and QUEL languages were extended
    - GRANT and REVOKE Statements
    - Read access on EMP to User group A Where  
EMP.Salary < 30K and EMP.Dept  $\neq$  Security
  - Query Modification:
    - Modify the query according to the access control rules
    - Retrieve all employee information where salary < 30K and Dept is not Security