# What's covered here?

- Database System History

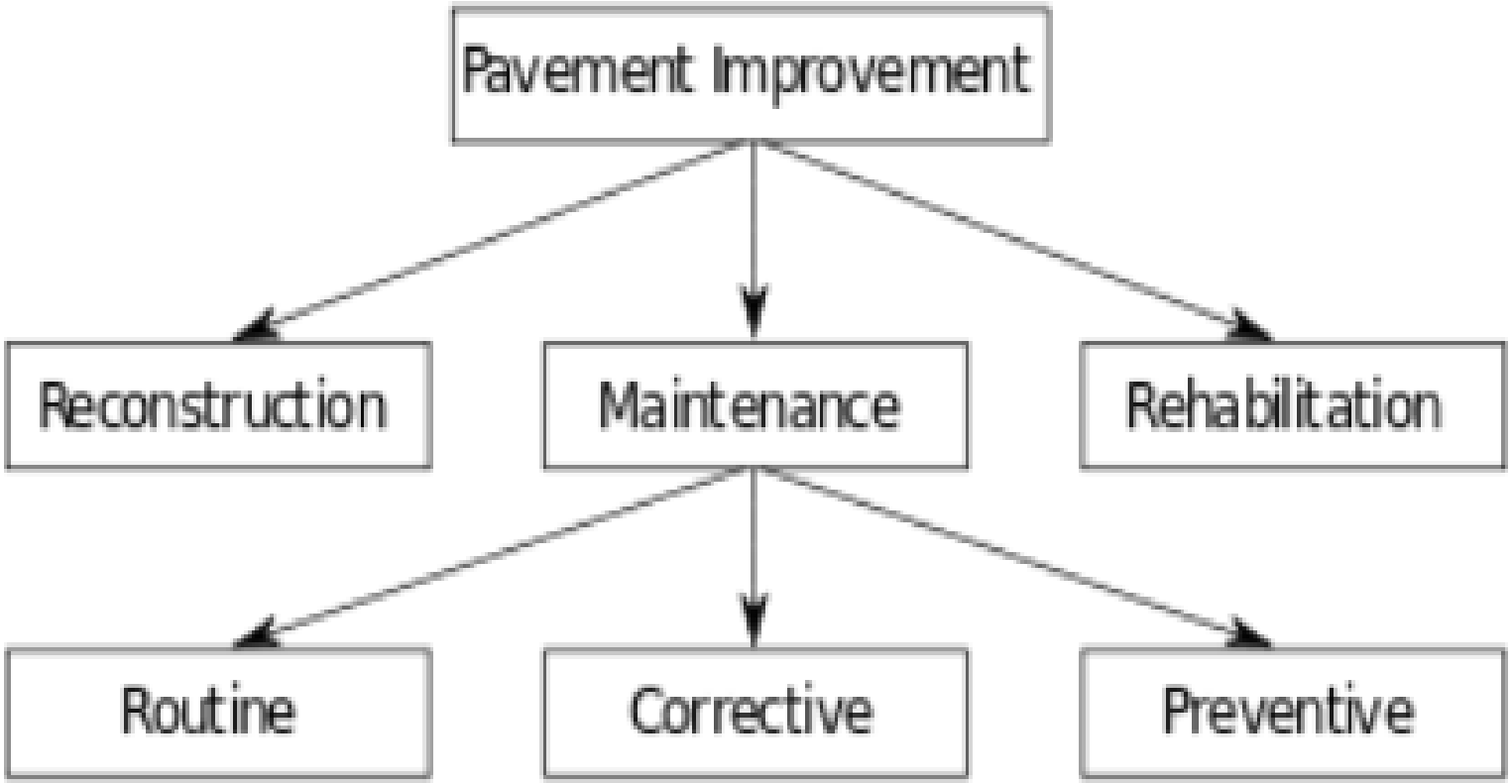
# History of Database Theory

- ‘File Cabinet’ Database (paper systems)
- Hierarchical Database
- Network Database
- Relational Database
- Object Database
- NoSQL

# Hierarchical Databases

- Introduced by IBM in late 1950's & early '60s
- Followed 'File Cabinet' line of thinking

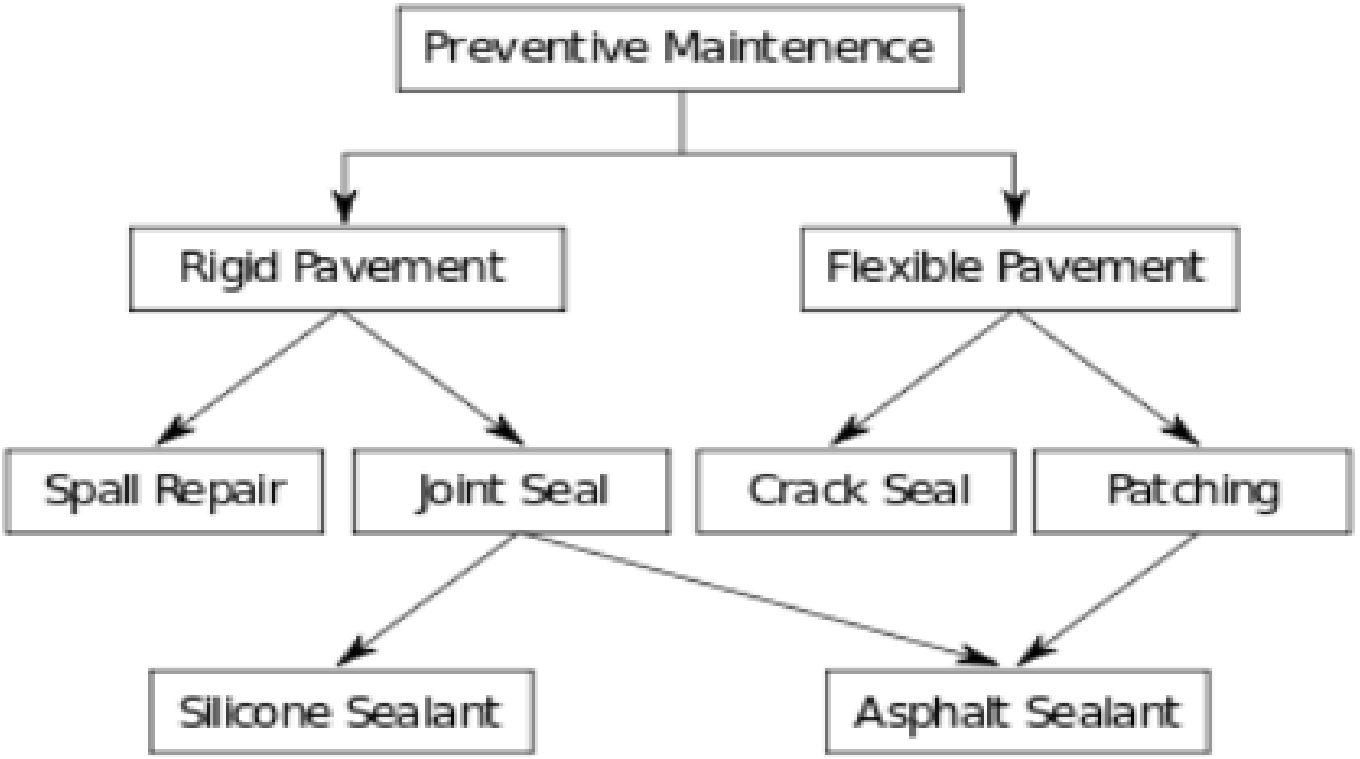
# Hierarchical Data Model



# Network Databases

- Introduced by IBM in late 1960's & early '70s
- Intended to fix problems of hierarchical model

# Network Data Model

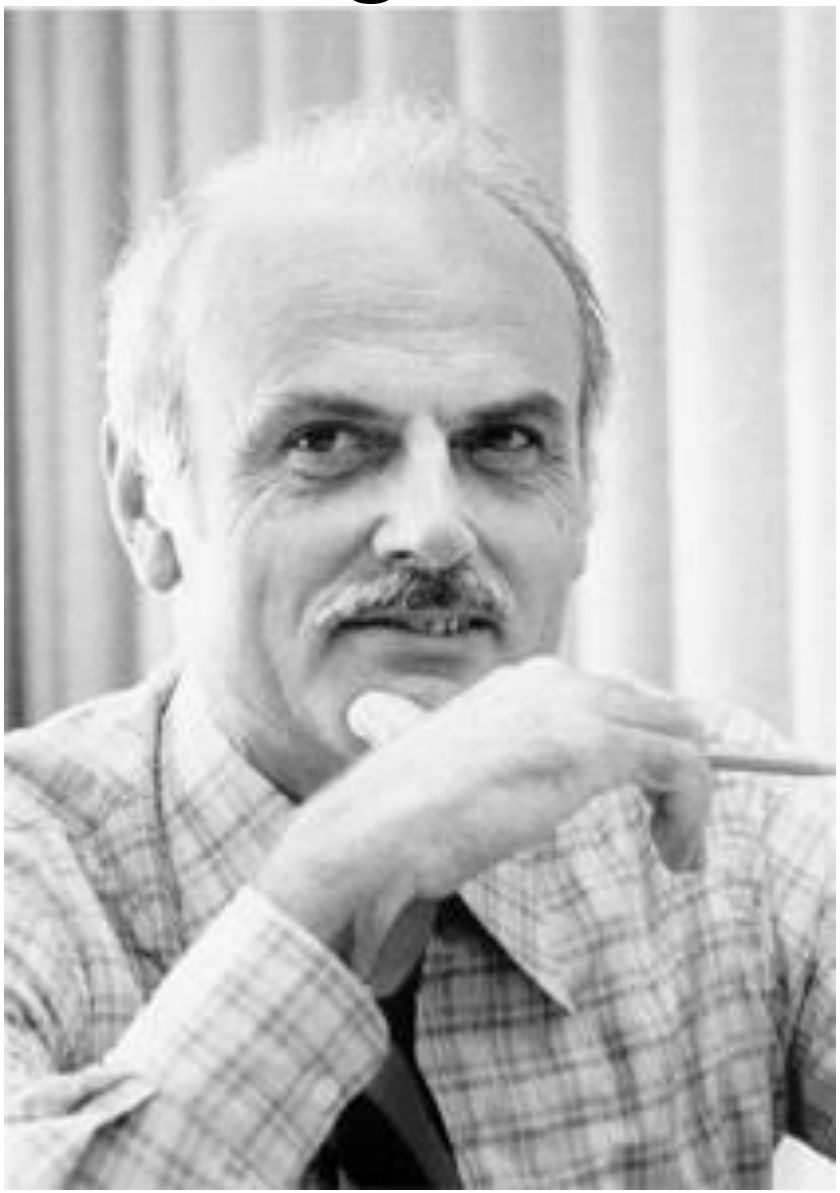


# How to fix problems of databases?

- Less expensive to implement & maintain
- Less dependent on experts
- Efficient use of physical resources
- Able to scale
- Guaranteed accurate data

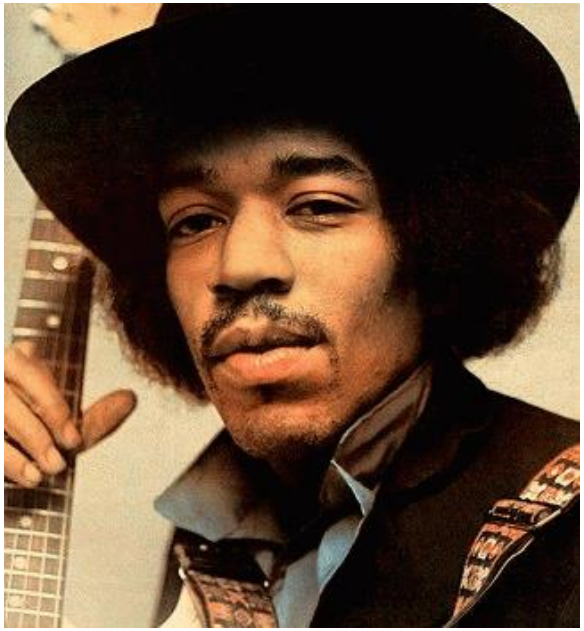
# Jimi Hendrix

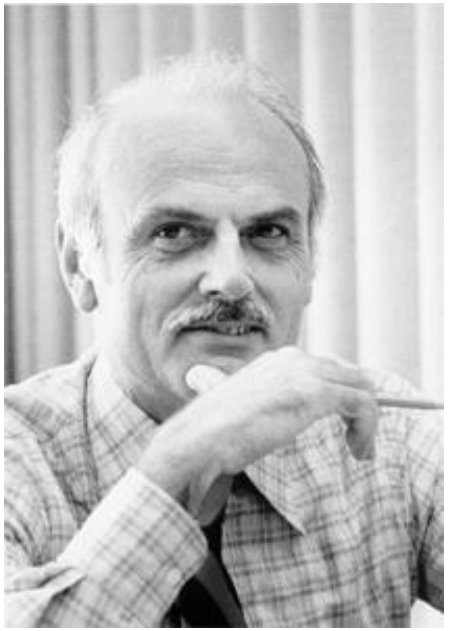
# Dr. Edgar Codd



# Very similar impact…

- Giants…Innovators…legends
  - Creativity and brilliance changed decades of status quo
  - Single-handedly revolutionized their industry
  - 40 years later still not only current but highly influential





# Relational Data Model

- Introduced in early ‘70s and gradually implemented beginning ~1980

- ELIMINATED (*almost*) all previous problems
  - Records linked together by ALL relationships

# Big Picture on Relational Model

- Efficiency: Data is stored in exactly ONE place
- Standards Developed
  - SQL is used to manage systems and data
  - Design methodology (Normalization)

# Hierarchical & Network Databases

- *Due to limitations no longer prevalent after 1980…*

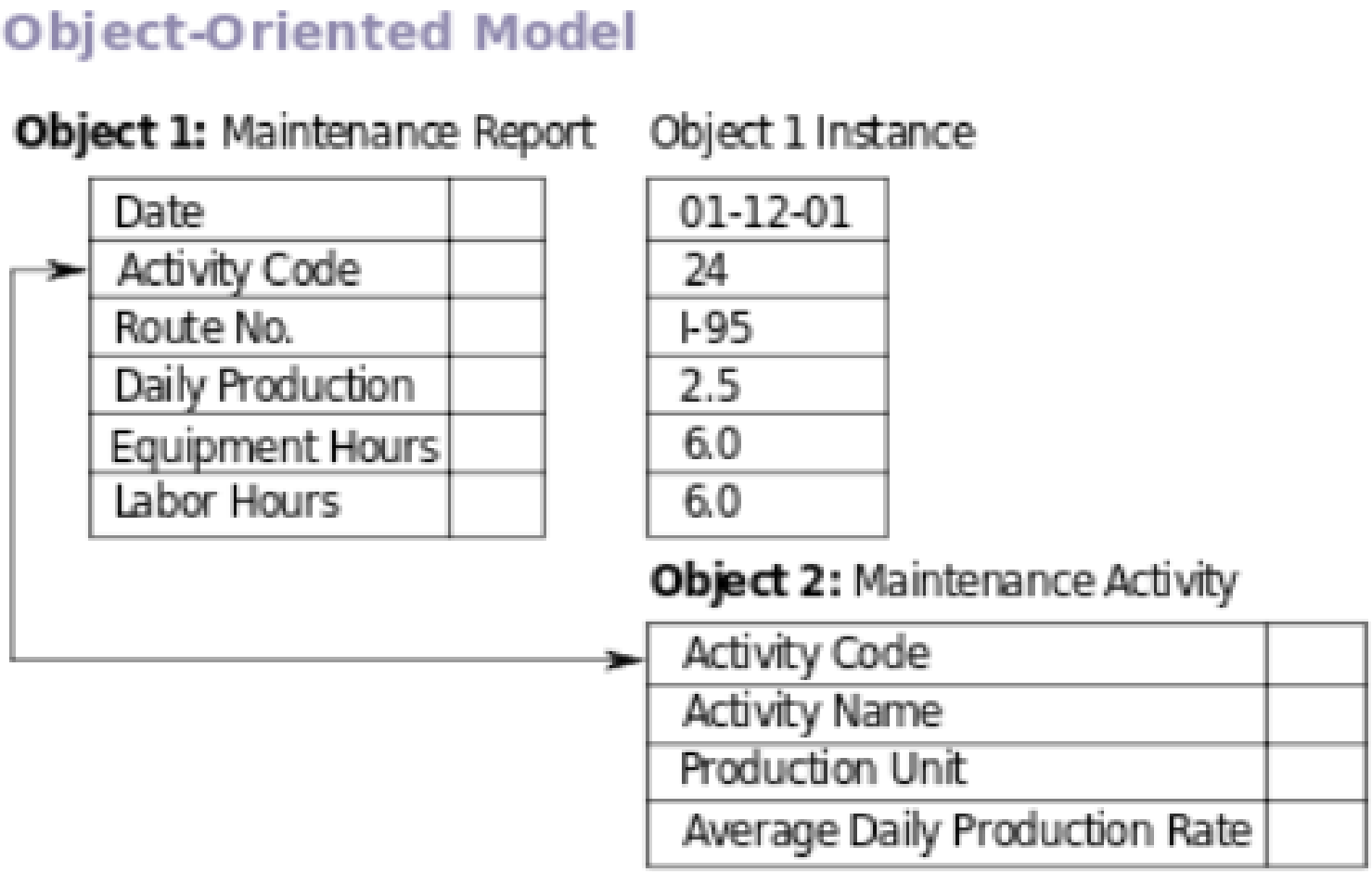

# Object Database

- Started in 1990s
- Provided Object Oriented features, such as encapsulation and polymorphism
- Object databases suffered due to lack of standardization

# Object Database

- Implemented for specialized applications such as engineering or molecular biology databases
- Object database features were extended to RDBMS and SQL language

# Object-Oriented Model



# Big Picture on NoSQL

- Umbrella term for all databases and data stores that don't follow strict RDBMS principles
- Often relate to large data sets accessed and manipulated on Web scale
- Represents collection of diverse, and sometimes related, concepts about data storage and manipulation.
- Often provide SQL-like interface

# RDBMS vs NoSQL

Denormalizing tables, dropping constraints, and relaxing transactional guarantee can help an RDBMS scale, but after these modifications, an RDBMS starts resembling a NoSQL product.