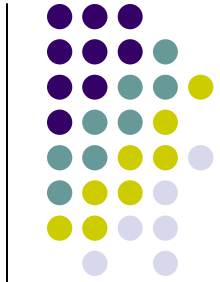

Data Vault Modeling

The Next Generation DW Approach

Presented by: Siva Govindarajan

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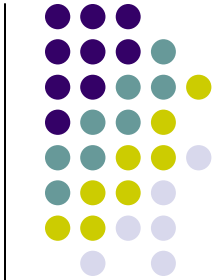
SIVA02@GLOBYTES.COM

Data Vault Modeling
Agenda



- Introduction
- Data Vault Place in Evolution
- Data Warehousing Architecture
- Data Vault Components
- Case Study
  - Typical 3NF / Star Schema
  - Data Vault Approach
  - Temporal Data + Auditability
- Implementation of Data Vault
- Conclusion

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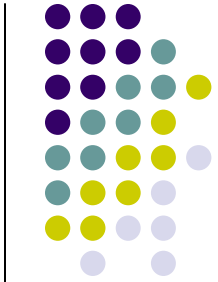
Introduction



- Data Vault concept originally conceived by Dan Linstedt
- Enterprise Data Warehouse Modeling approach.
- Hybrid approach - 3NF & Star Schema
- Adaptable to changes
- Auditable
- Timed right with Technology

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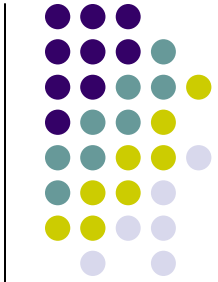
Data Vault Place in Evolution



- 1960s - Codd, Date et. al Normal Forms
- 1980s - Normal Forms adapted to DWs
- 1985+ - Star Schema for OLAP
- 1990s - Data Vault concept developed Dan Linstedt
- 2000+ - Data Vault concept published by Dan Linstedt

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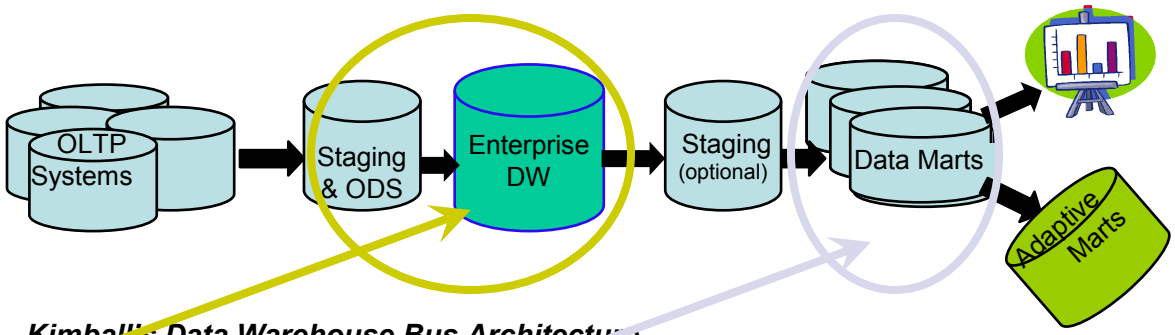
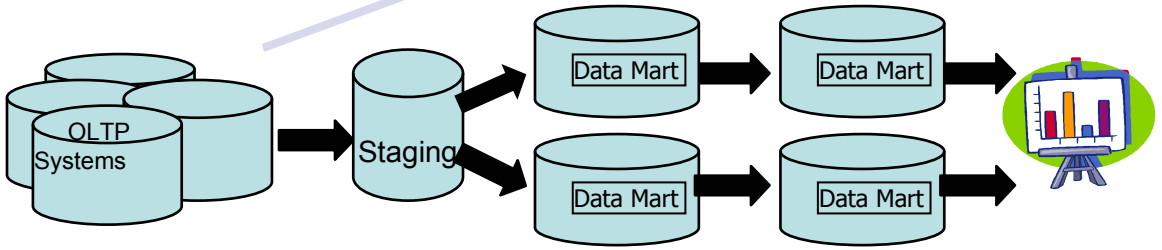
Data Warehousing Architecture

Bill Inmon's Data Warehouse Architecture



Kimball's Data Warehouse Bus Architecture



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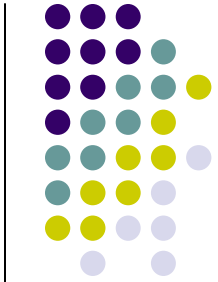
Data Vault Components



- Hub Entities
  - Candidate Keys + Load Time + Source
- Link Entities
  - FKs from Hub + Load Time + Source
- Satellite Entities
  - Descriptive Data + Load Time + Source + End Time
    - Dimension = Hub+ Satellite
    - Fact = Satellite + Link [+ Hub]

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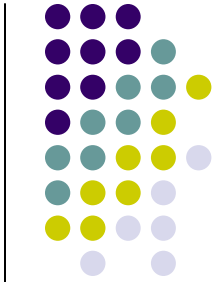
Case Study



- Modeling Approaches
  - Typical 3NF / Star Schema
  - Data Vault approach
- Scenario
  - Typical Fact and Dimension
  - New Dimension data
  - Reference Data change - 1:M to M:M
  - Additional attributes to Dimension

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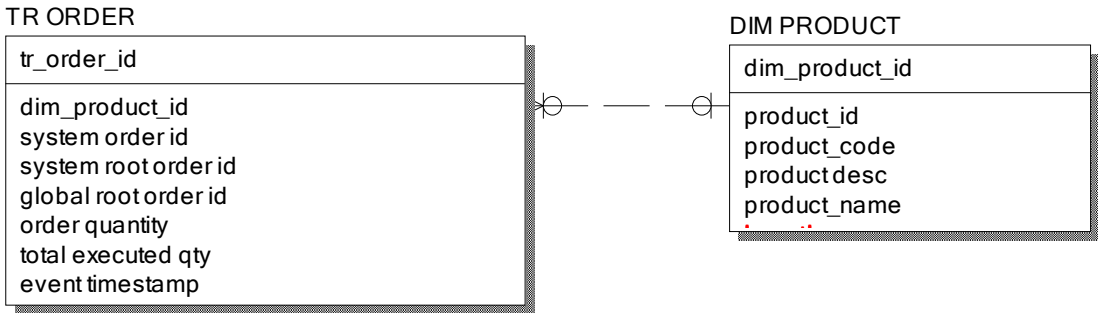
Typical 3NF / Star Schema

1. Typical Fact and Dimension



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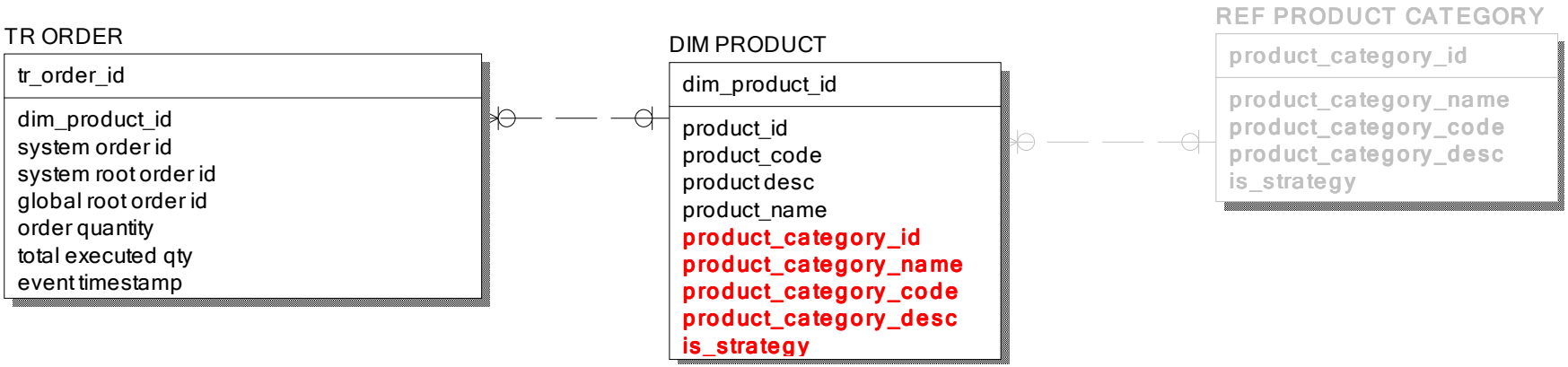
Typical 3NF / Star Schema

2. New Dimension Data



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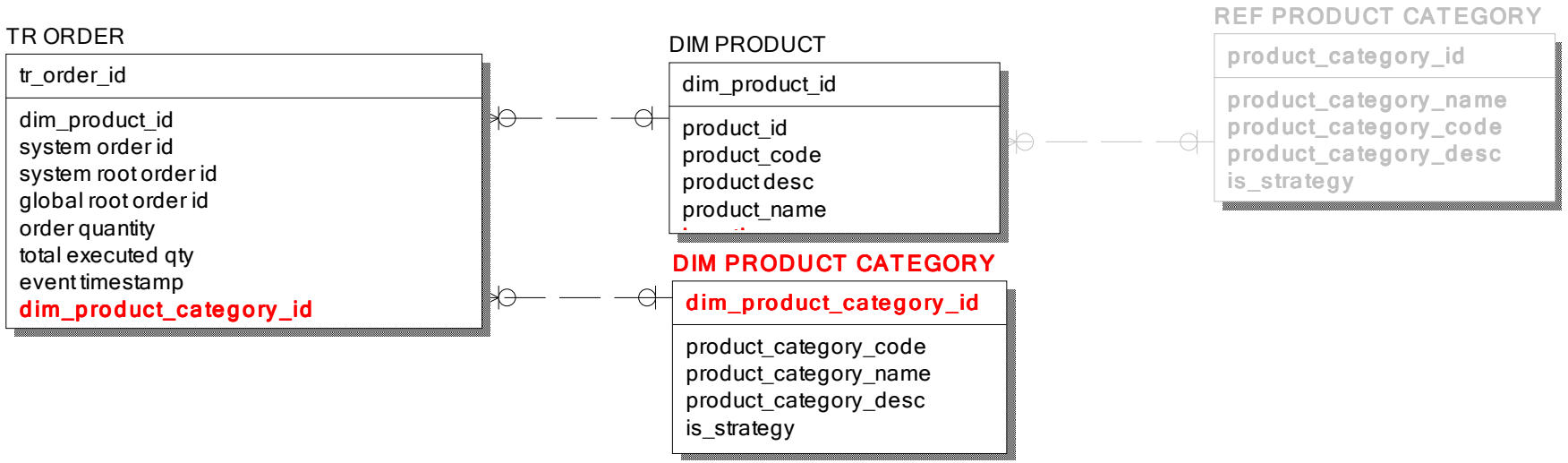
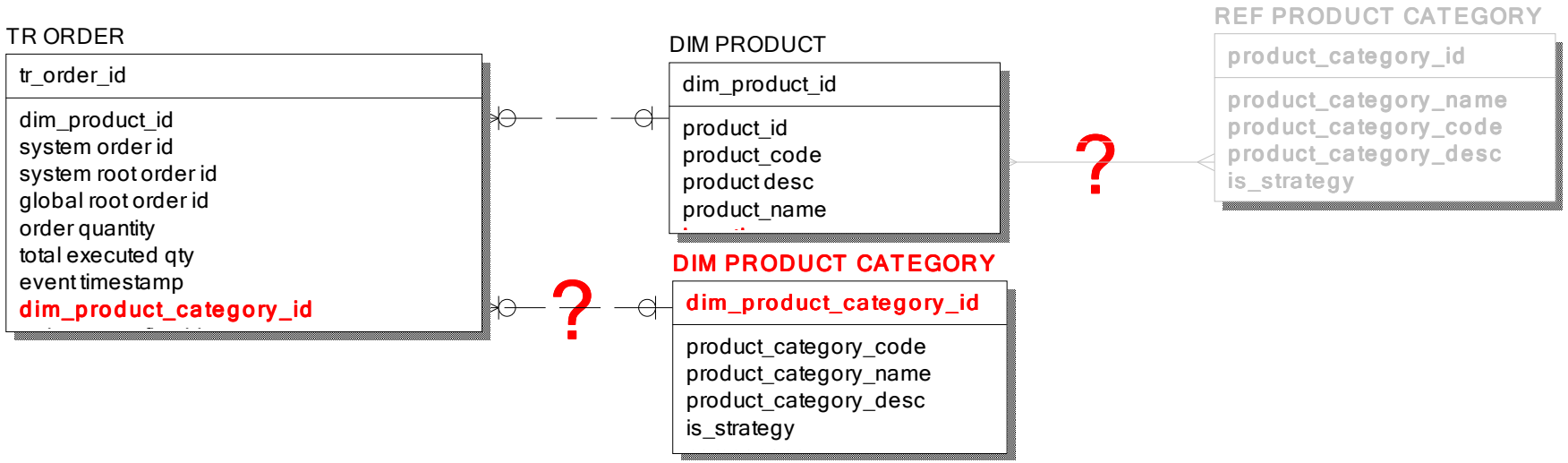
Typical 3NF / Star Schema

2. New Dimension Data



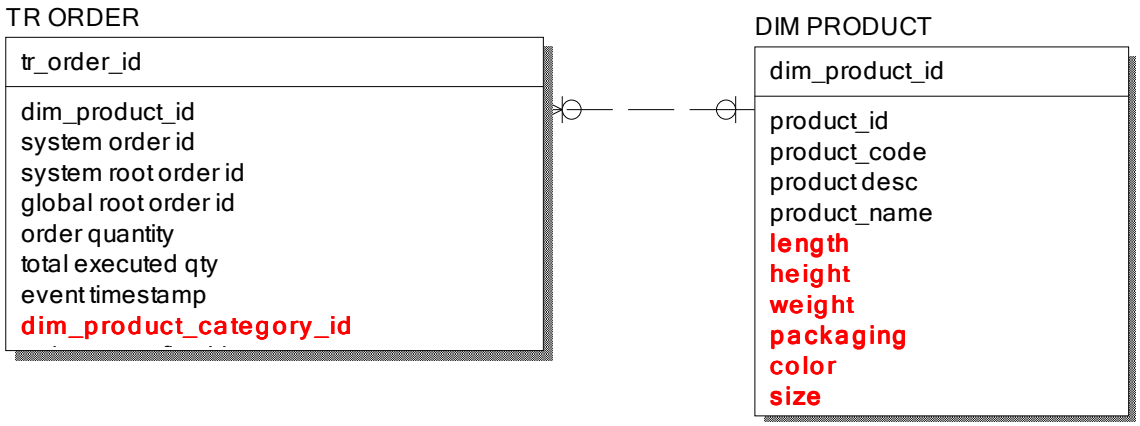
Typical 3NF / Star Schema

3. Reference 1:M to M:M Change



Typical 3NF / Star Schema

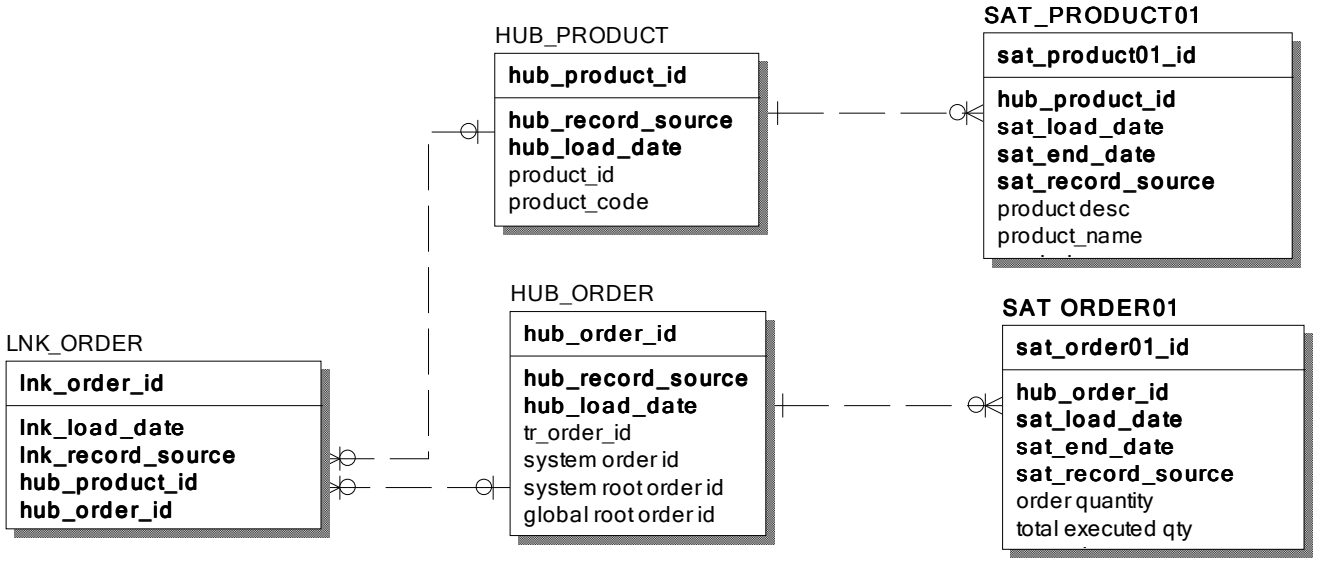
4. Additional attributes to Dimension



Data Vault Approach

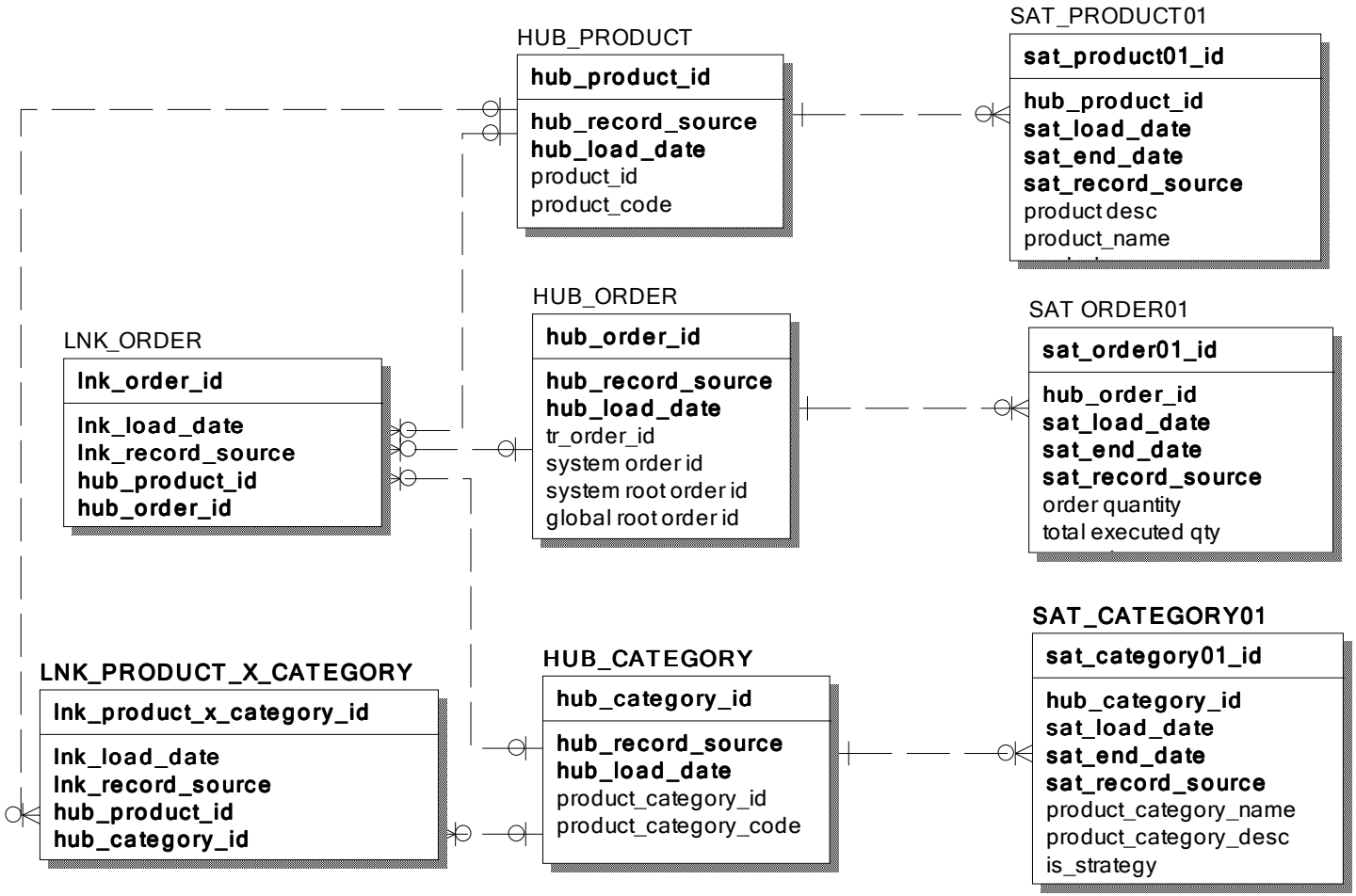
1. Typical Hub, Satellite and Link

(Replacing Fact/Dimension)



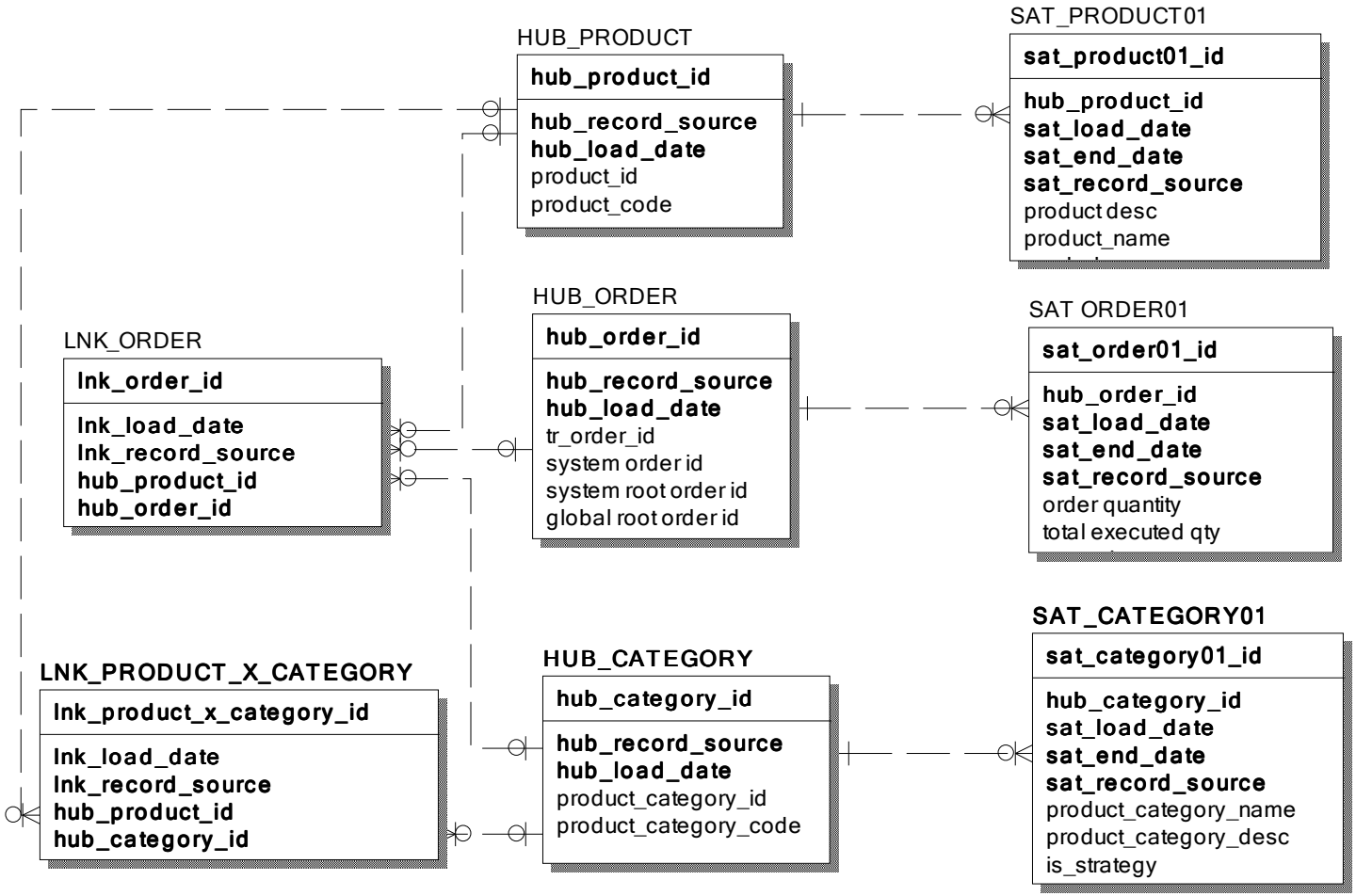
Data Vault Approach

2. New Dimension Data



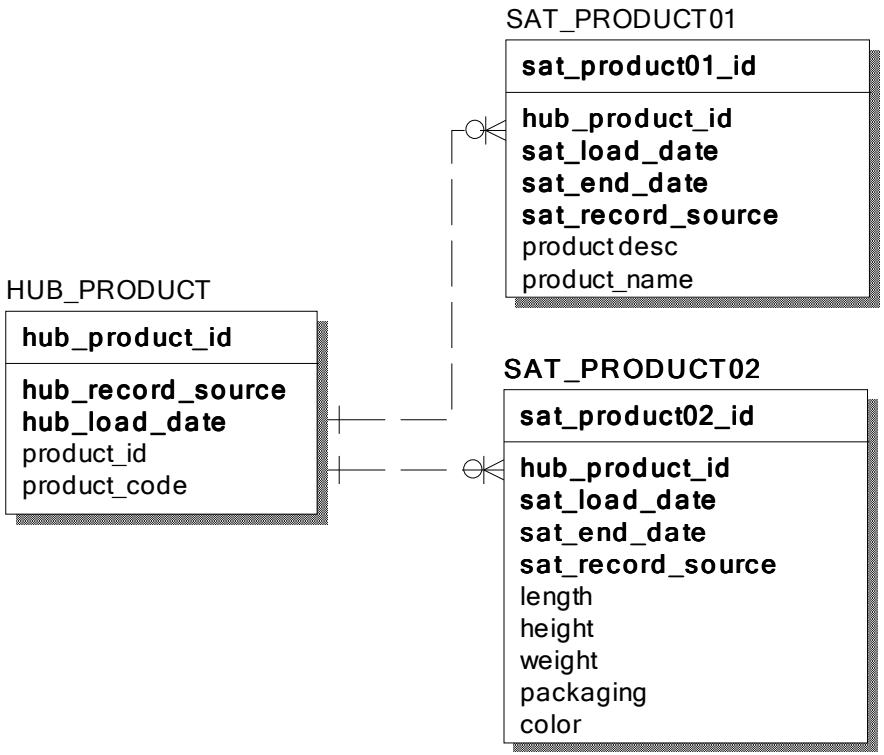
Data Vault Approach

3. Reference 1:M to M:M Change



Data Vault Approach

4. Additional attributes to Dimension



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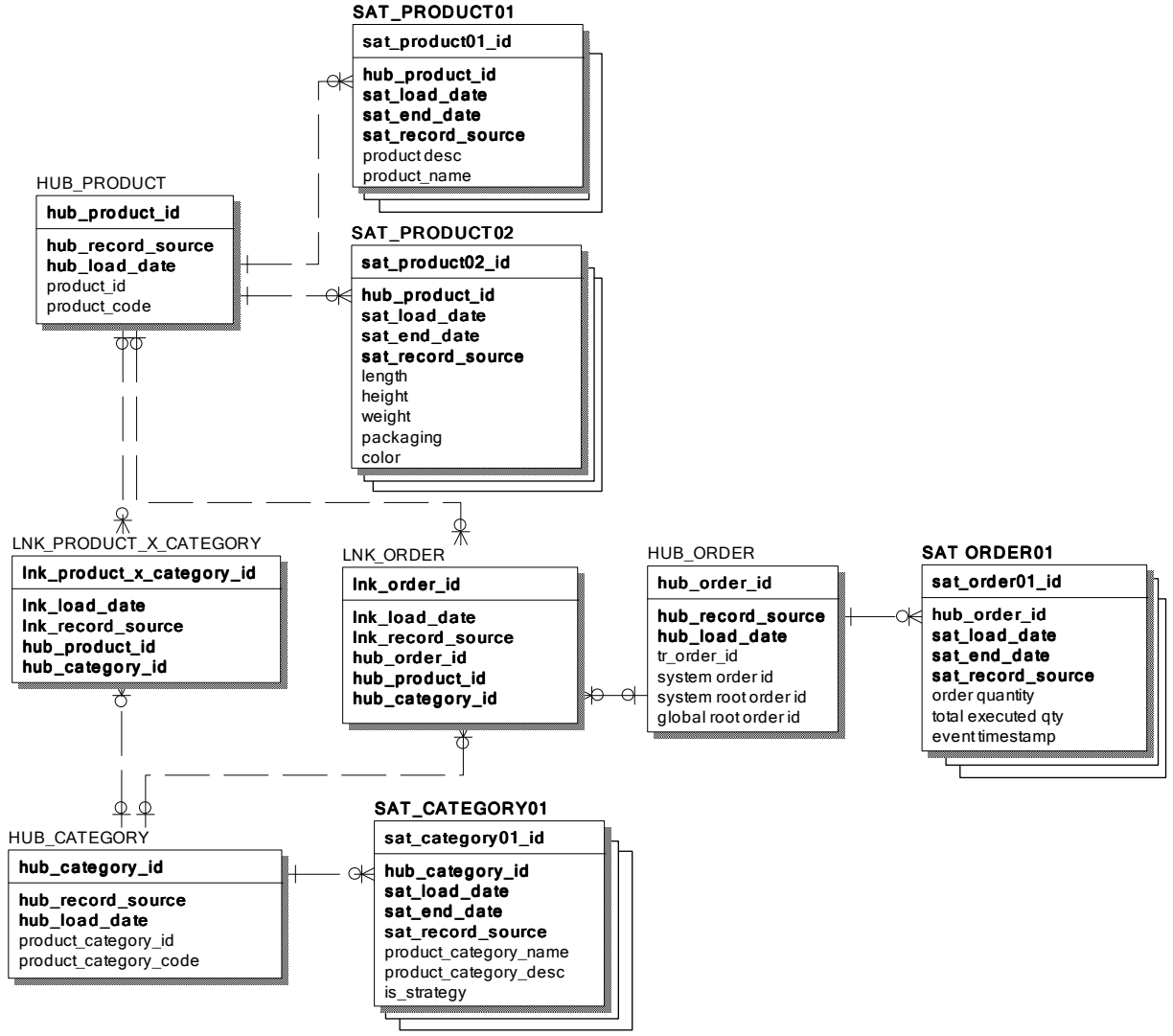
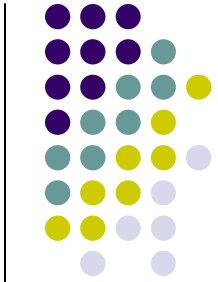
Temporal Data + Auditability



Implementation of Data Vault



- Make it Simple
  - View for Dimension
  - View For Fact
- Data Loading
- Take advantage of Technology
  - DW Appliances
  - High-throughput storage devices
  - RDBMS Features

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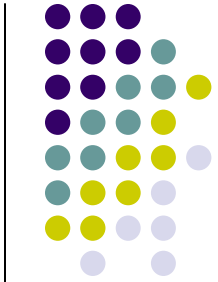
Make it Simple



- Create views for Dimension

From our Demo model, Join Product related Hubs and Satellites to build View for Product Dimension as shown below :

- HUB_PRODUCT
- SAT_PRODUCT01
- SAT_PRODUCT02

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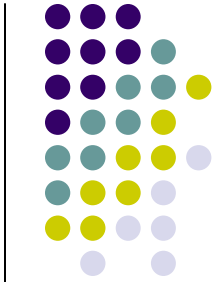
Make it Simple



- Create Views For Fact

Join Order related Hubs, Satellites and Links to build View for ORDER Fact using ORDER related Hubs/ Satellites and Links.

- HUB_ORDER
- SAT_ORDER01
- LNK_ORDER

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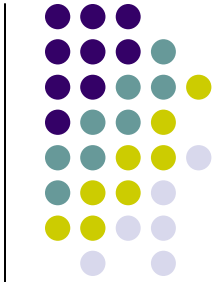
Data Loading



Typically data loading for a Data Vault is in the following sequence.

- Hubs for Dimensions
- Links for Dimensions
- Satellites for Dimensions
- Hubs for Fact (if any)
- Links for Fact
- Satellites for Fact

Refer to Data Vault Series article 5 of Linstedt for further details

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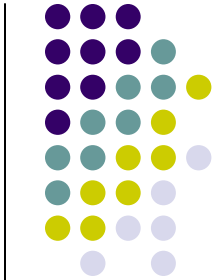
DW Appliances



Next wave of IT Data Warehouse hardware solutions are the Data Warehouse Appliances. Take advantage of the technology where possible. Few DW Appliances in the market :

- Oracle Exadata
- Netezza
- Teradata
- RedBrick
- GreenPlum

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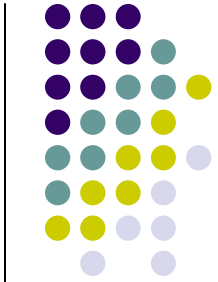
High-throughput storage devices



Utilize Storage devices designed for DW / OLAP applications. Following are some examples only and would change over time. Please do your research based on your sizing requirements.

- EMC CLARiiON Storage family
- Texas Memory systems RamSan – Solid State devices
- Hitachi USP / VSP Storage family
- Other Hybrid solutions with High performance storage and Solid State devices

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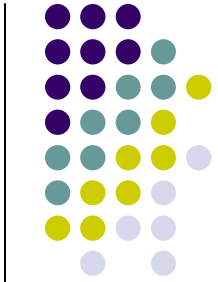
RDBMS Features



Some Oracle Features catering DW / OLAP applications:

- Exadata Smart Scans
- OLAP Based Materialized views
- Partitioning Reference partition
- Advanced data compression
- Automatic degree of parallelism (ADOP).
- Star query optimization
- Oracle OLAP/DWH Features.

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Conclusion

In this presentation we have addressed high level overview of Data Vault Architecture. Topics discussed are

- Data Vault concept and architecture
- Data Vault Components such as Hubs, Satellites and Link tables
- Typical modeling challenges with traditional modeling approaches
- How those challenges could be handled using Data Vault Modeling Approach.
- Auditing and Temporal data capture using DV Approach.
- And finally, some implementation details

If interested in learning more, try

Dan Linstedt's special coaching area at:

http://danLinstedt.com/my-coach.

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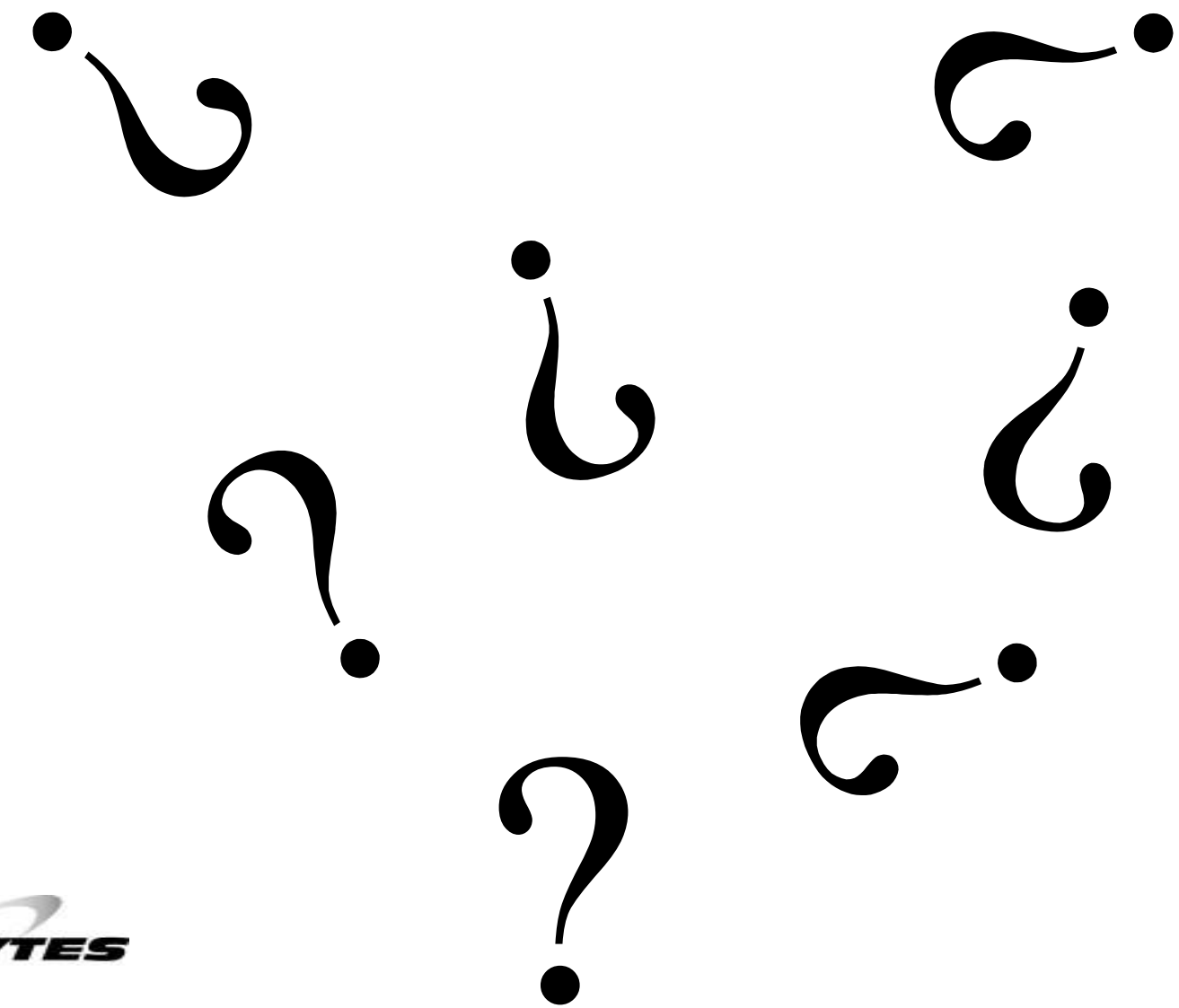
Questions ?



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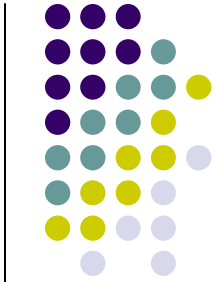
References



- Data Vault Series articles by Dan E. Linstedt -- http://www.tdan.com
- Referred few articles from Genesee Academy -- http://geneseeacademy.com
- Articles and books by Ralph Kimball and Bill Inmon from multiple sources.
- Technical Documents from http://www.oracle.com/technetwork

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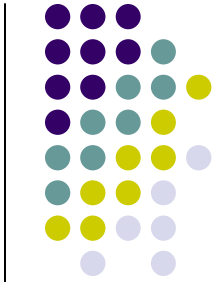

Special Thanks to

- Dan Linstedt for review and corrections to the article.
- My colleague Mark Bruscke for his assistance in preparing the article.

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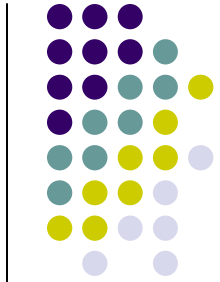
The End



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