

4.

-
- 3 (DB) –
 - (Data Language)
 - (User)
 - (DBMS)
 - (DBA)
 - (Hardware)

4.1 3

□ 3

-
-
-

□ (schema)

- (,)
- (external schema)
- (conceptual schema)
- (internal schema)

3

□ (external schema)

-
-
- subschema

□ (conceptual schema)

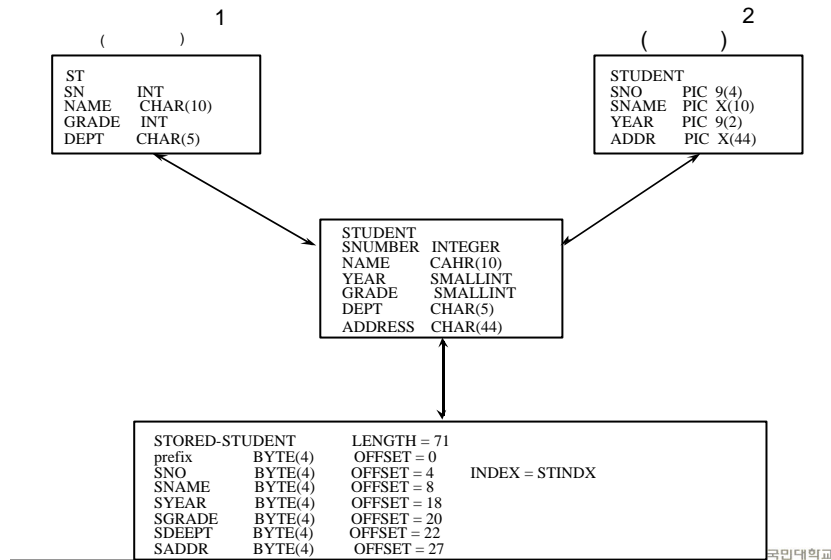
-
-
- schema

□ (internal schema)

-
-

3

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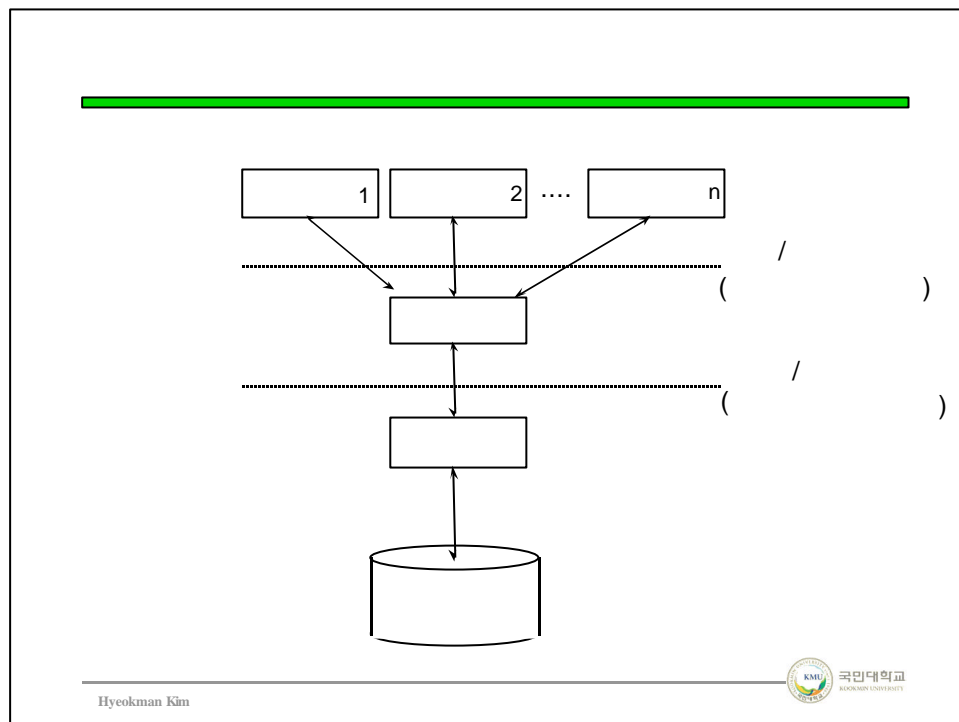
3

(Mapping)

- /
—
— (application interface)
—
- /
—
— (storage interface)
—

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□ Notes

– 3

◆ (data independency)

– ()

–

◆ E - R Diagram

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□ (data dictionary)
(DBA)

—
— ()
— (catalog)

□ (data directory)

— “ ”
—
◆ :
◆ :

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4.2

□ (Data Language)

— , ,

□

— (DDL, Data Definition Language)
— (DML, Data Manipulation Language)
— (DCL, Data Control Language)

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- (DDL, Data Definition Language)
 -
- -
 - ◆ ,
 - ◆ Subschema DDL, Schema DDL
 -
 - ◆
 - ◆ (DSDL, Data Storage Definition Language)
 -

- (DML, Data Manipulation Language)
 - () DBMS
 - : , (, ,)
- (procedural) DML
 -
 - what how
 - (one - record - at - a - time)
 - (embedded)
 - DML
- (non - procedural) DML
 -
 - what
 - (set - of - records - at - a - time)
 - , :
 - ◆ (Query Language)

□ Notes

- - ◆ Completeness of data language
 - ◆ 가
- (DSL, Data Sublanguage)
 - ◆ DML

□ (DCL, Data Control Language)

-
- - (security)
 - (integrity)
 - (recovery)
 - (concurrency)

4.3 (User)

- (end user)
 - DML()
 - menu, form, graphics
- (application programmer)
 - + DML(DSL)
- (DBA)
 - DDL + DCL DB

4.4 (DBMS)

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./././
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4.5

□ (DBA, Database Administrator)

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□ DBA

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- ◆
- ◆
- ◆
- ◆
- ◆
- ◆
- ◆
- ◆

, ,
(backup), (recovery)

—

- ◆
- ◆

—

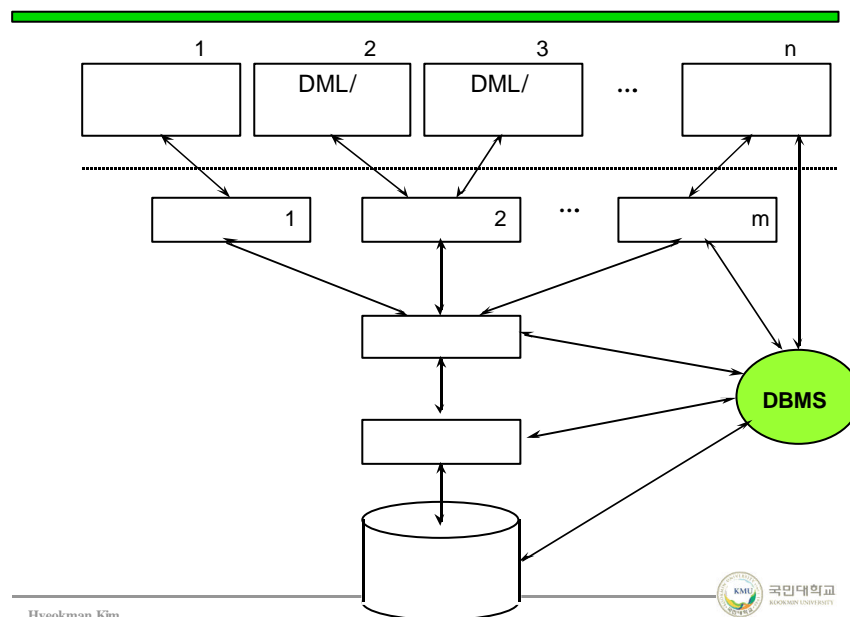
- ◆
- ◆

, , , , , ,

4.6

- - backend processor
 -
 - (associative)
 - (parallel processing)
- (backend)
 - +
- - IDM(IntelligentDatabaseMachine)
 - Teradata

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