IMS DB ONLINE TRAINING – DAY 1

Evolution of Data Storage (1950s → 1980s)

Files (PS,VSAM) -> Databases

(IMS (IBM) (Mid 1960s-70s),
IDMS(CA) (Mid 1960s-70s),
DB2 (IBM) (1980s))

Batch Processing (50s) -> Online Processing (60s)

1. Involves preparation of Input data and then process in bulk without any program interruption
2. Bulk Data Processing
3. Non-conversational program

Ex:- Payslip print program

1. Involves continuous Input, Process and Output of Data in near Real time many program interruptions
2. Single Data processing
3. Conversational program

Ex:- ATM cash withdrawal

Data Management Concepts

1. Application Oriented Approach
   a. Application evolved one at a time
   b. Customized Data files for each Application
2. Centralized Database Approach
   a. Applications data fields are merged
   b. Data Security is at risk
3. The Normalization Process

Data Management Concepts

1. Application Oriented Approach

The Figure below illustrates the common data elements that might be required by each department :-

Payroll	HR	Medical
Social Security Number	Social Security Number	Social Security Number
Name	Name	Name
Address	Address	Address
Salary	Martial Status	Department
Pay Period	Sex	Allergies
Deductions	Dependents	Visits
Exemptions	Job code	Treatments
Absences	Performance evaluations	Medications

Data Management Concepts

2. Centralized Database Approach

Social Security number
Name (last, first, initial)
Salary
Pay period
Deductions
Exemptions
Absences
Marital status
Sex
Dependents
Job code
Performance evaluations
Department
Allergies
Visits
Treatments
Medications

Data Management Concepts

3. The Normalization Process (Hierarchical Structure)

Normalization analyses inter-relationship of data fields and organize logically related fields into non-redundant groups and form a simple database

Social Security number
Name (last, first, initial)
Address (street, city, state, zip)

Salary
Pay Period
Deductions
Exemptions
Absences

Martial Status
Sex
Dependents
Job code
Performance evaluations

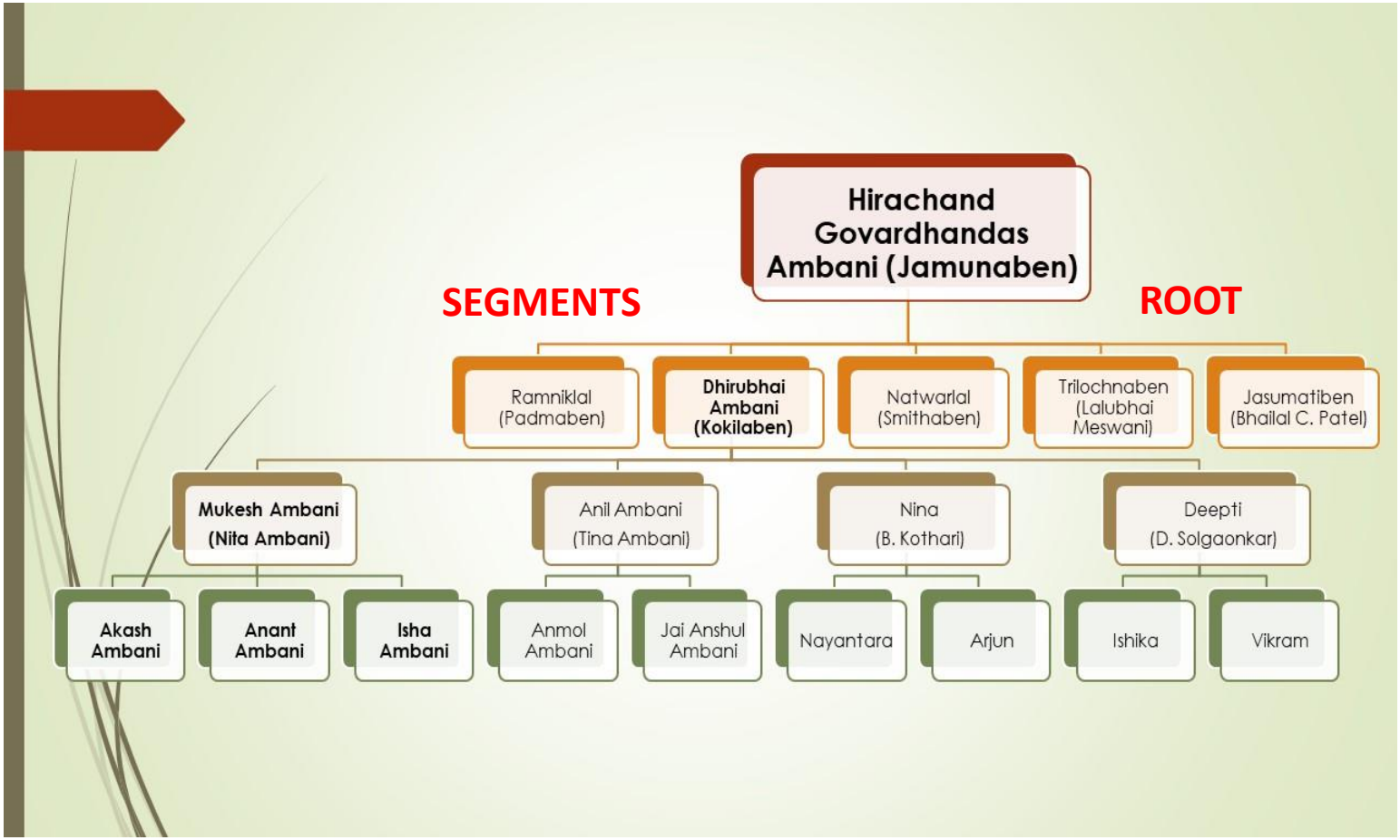
Department
Allergies
Visits
Treatments
Medications

Why do we need a Database

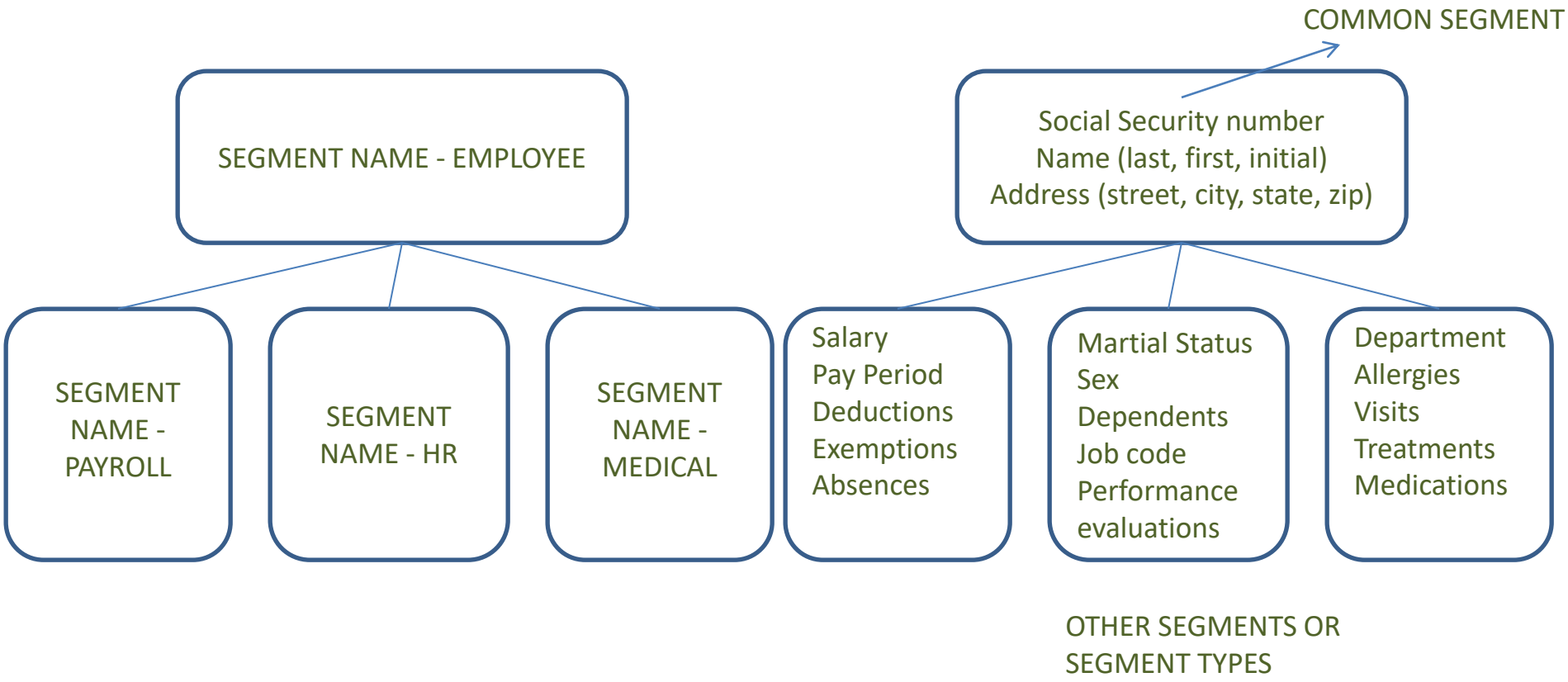
1. To reduce Data Redundancy
2. For Data Independence
3. Data Security (Field Level Sensitivity)
4. Data Locks
5. Data Integrity
6. Data Concurrency
7. Data Consistency
8. Data Logging (In-built Recovery features)

NEED FOR AN IMS DATABASE – Hierarchical Structure

Hierarchical Structure (Just for Terminology)



Hierarchical Structure



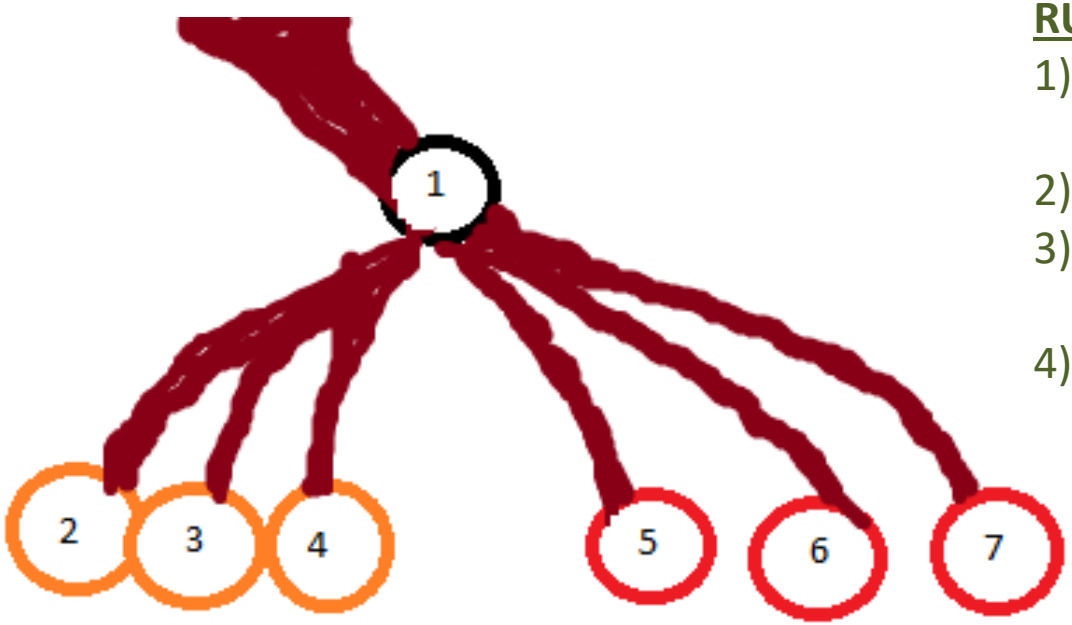
SEGMENT TYPE: GROUP OF DATA ELEMENTS/FIELDS ARE CALLED SEGMENT OR SEGMENT TYPE
SEGMENT OCCURRENCE: ACTUAL DATA OF ANY SEGMENT TYPE IS CALLED SEGMENT OCCURRENCE

ACCESS METHODS UNDER IMS

- HSAM - Hierarchical Sequential Access Method
- HISAM - Hierarchical Indexed Sequential Access Method
- HDAM - Hierarchical Direct Access Method
- HIDAM - Hierarchical Indexed Direct Access Method
- GSAM - Generalized Sequential Access Method

Access Methods are programs that interfaces with Data storage and the Application. These programs determines the way in which data to be shown to the user.

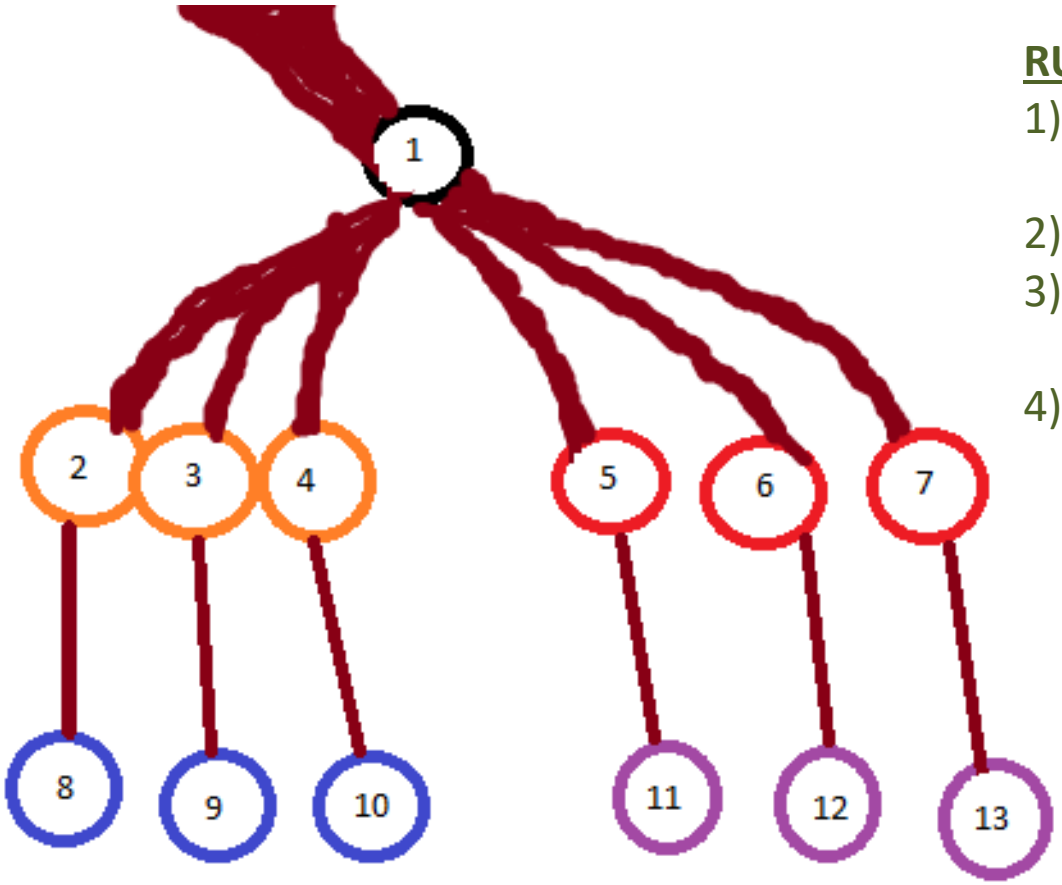
Exercise 1.1 (Hierarchical Processing)



RULES

1) Get all balls only once and no going back
2) Top to Down first
3) Front to Back within group next
4) Left to Right across groups in same level or one level above finally

Exercise 1.2 (Hierarchical Processing)

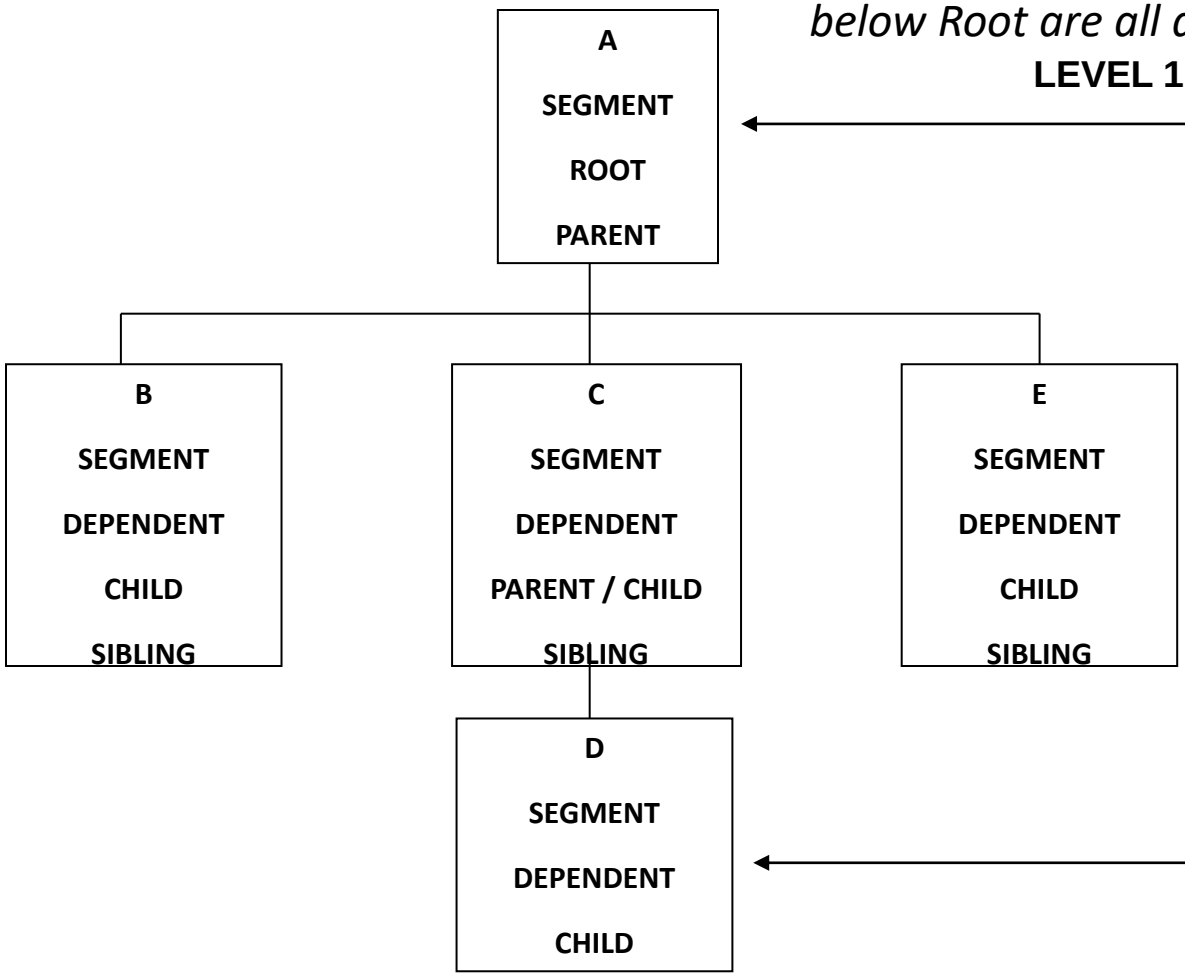


RULES

1) Get all balls only once and no going back
2) Top to Down first
3) Front to Back within group next
4) Left to Right across groups in same level or one level above finally

Representation of Hierarchical Structure

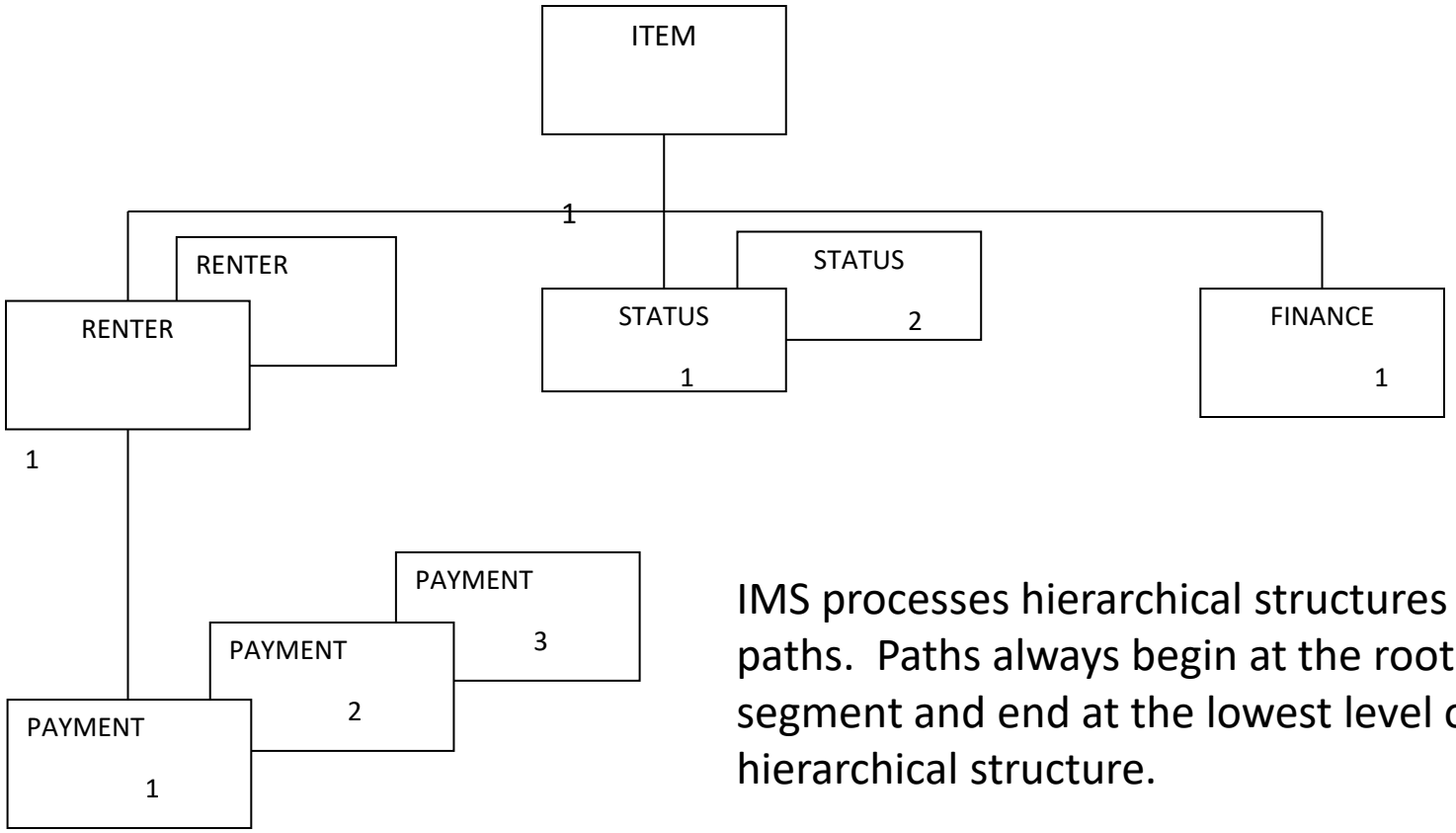
A Root *is the first segment at the top of a hierarchical data base structure. All segments below Root are all dependent segments.*



Each group of logically related data elements is called a ***SEGMENT***

MAXIMUM
15 Levels
255 Segments

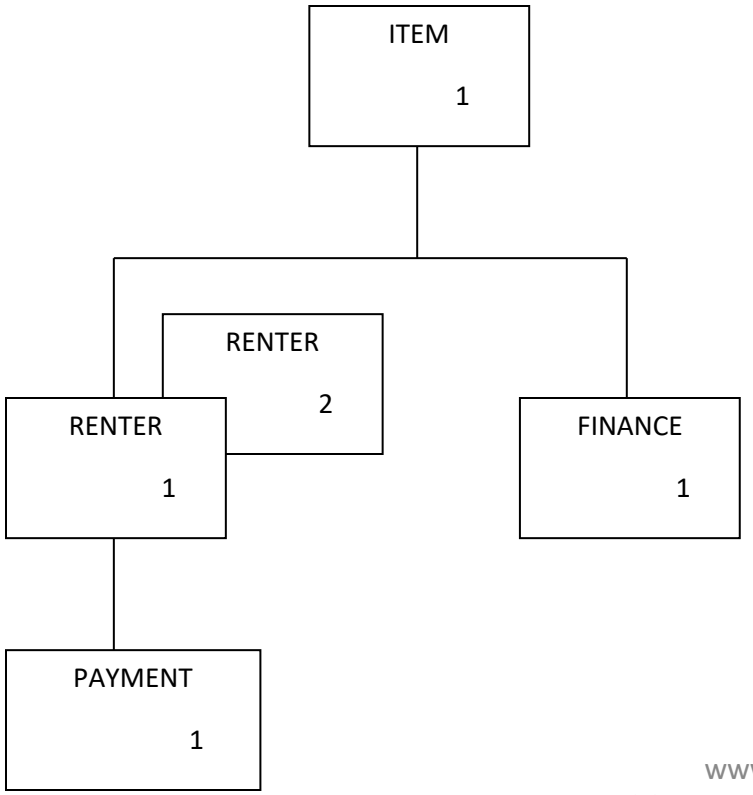
Exercise 1.3 (Hierarchical Processing)

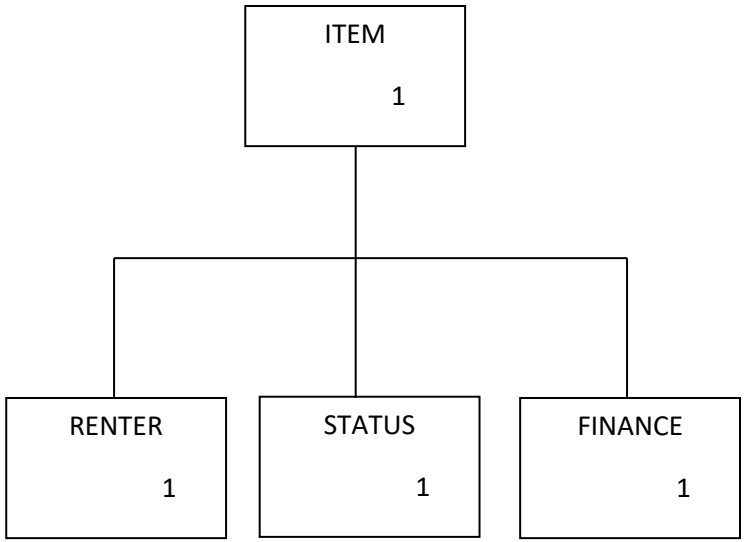


IMS processes hierarchical structures using paths. Paths always begin at the root segment and end at the lowest level of a hierarchical structure.

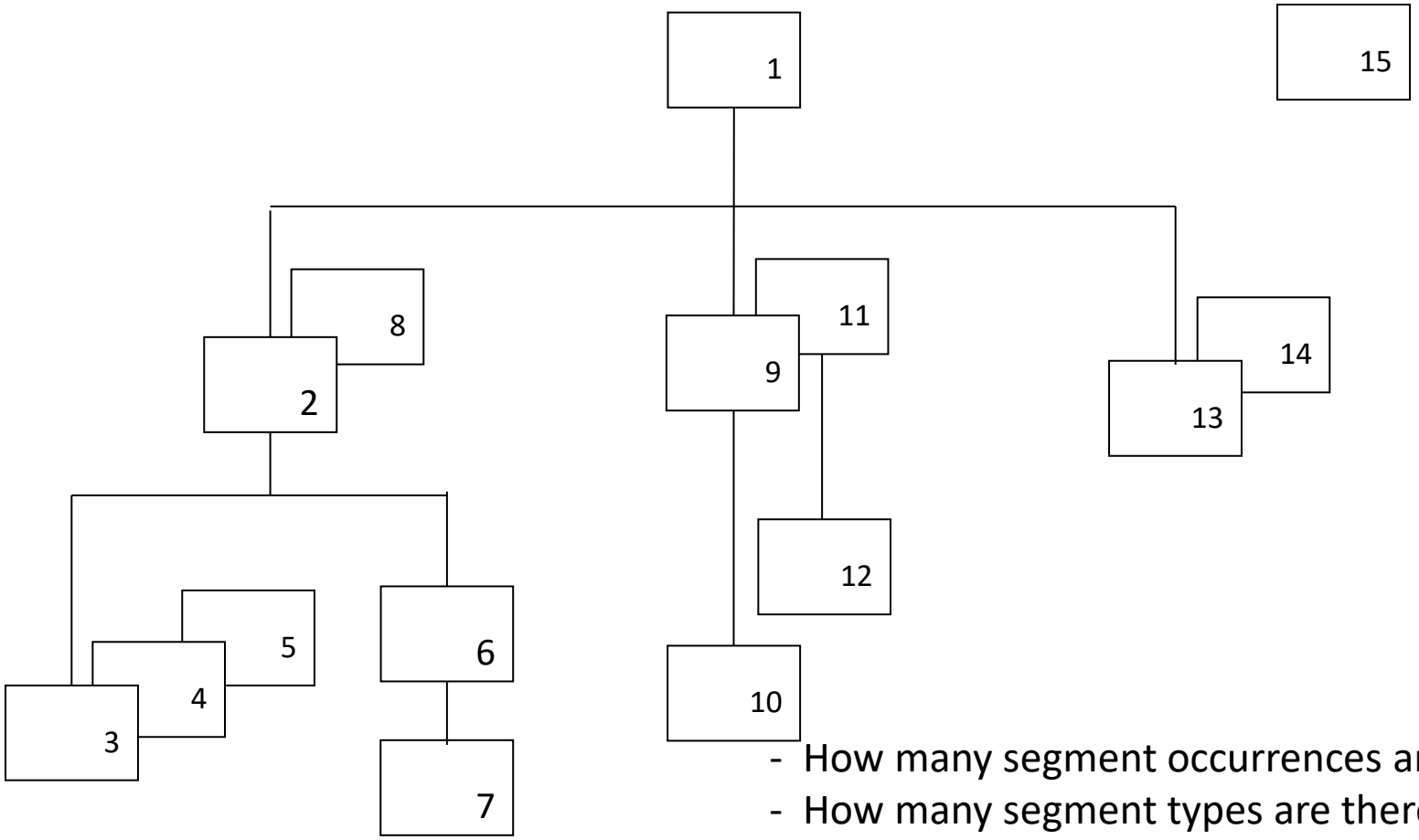
Exercise 1.4 (Hierarchical Processing)

A physical data base record is the single occurrence of a root and all its dependent segment occurrences. A physical record may or may not contain an occurrence for every possible segment type.





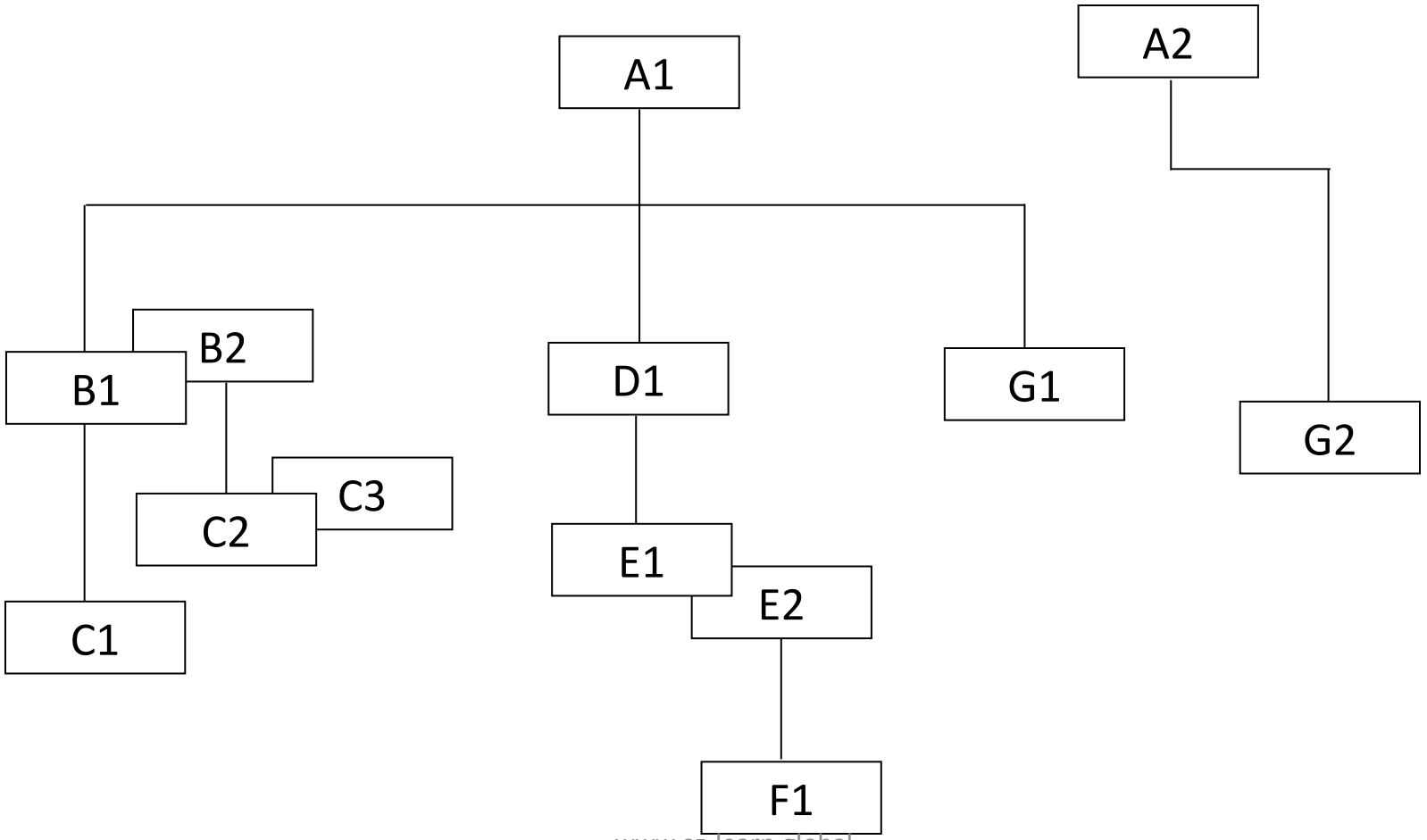
Exercise 1.5 (Hierarchical Processing)



- How many segment occurrences are there?
- How many segment types are there?
- How many data base records are there?

Exercise 1.6 – Hierarchical Sequence

Identify the Data processing Sequence:-



End of Day 1