Software Engineering: Data Flow Diagram – Part 2

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Example Software

- Consider a software called RMS calculating Software:
- Reads 3 integers in the range -1000 and +1000
- Finds out the root mean square(rms) of the three input numbers
- $\frac{1}{3} X\sqrt{}(a^2+b^2+c^2) = RMS$
- Displays the result

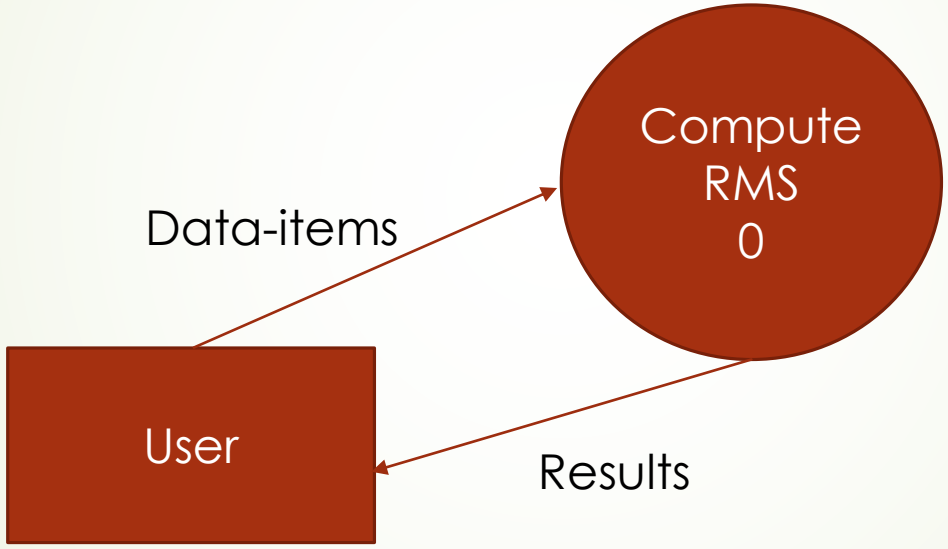
How is Structured Analysis performed?

- Initially represent software in the most abstract level:
- Called the **Context Diagram** or **Level 0 DFD**
- The entire system is represented as a single bubble.
- The bubble is labelled as the main function of the system

Higher Level DFDs

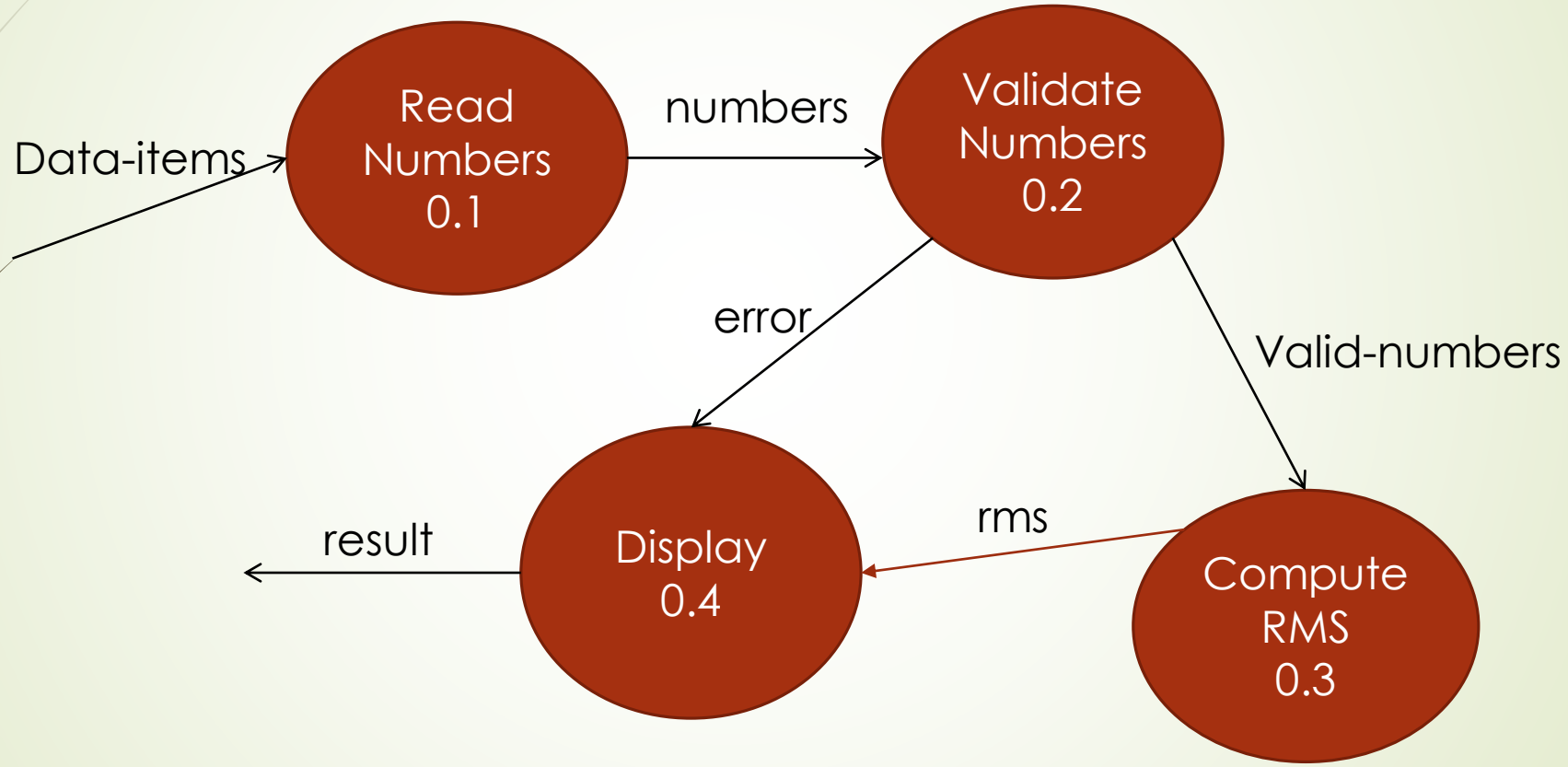
- Each high level function is separately decomposed into sub-functions:
  - Identify the sub-functions
  - Identify the data input to each sub-function
  - Identify the data input from each sub-function
- These are represented as DFDs

Example: RMS Calculating Software



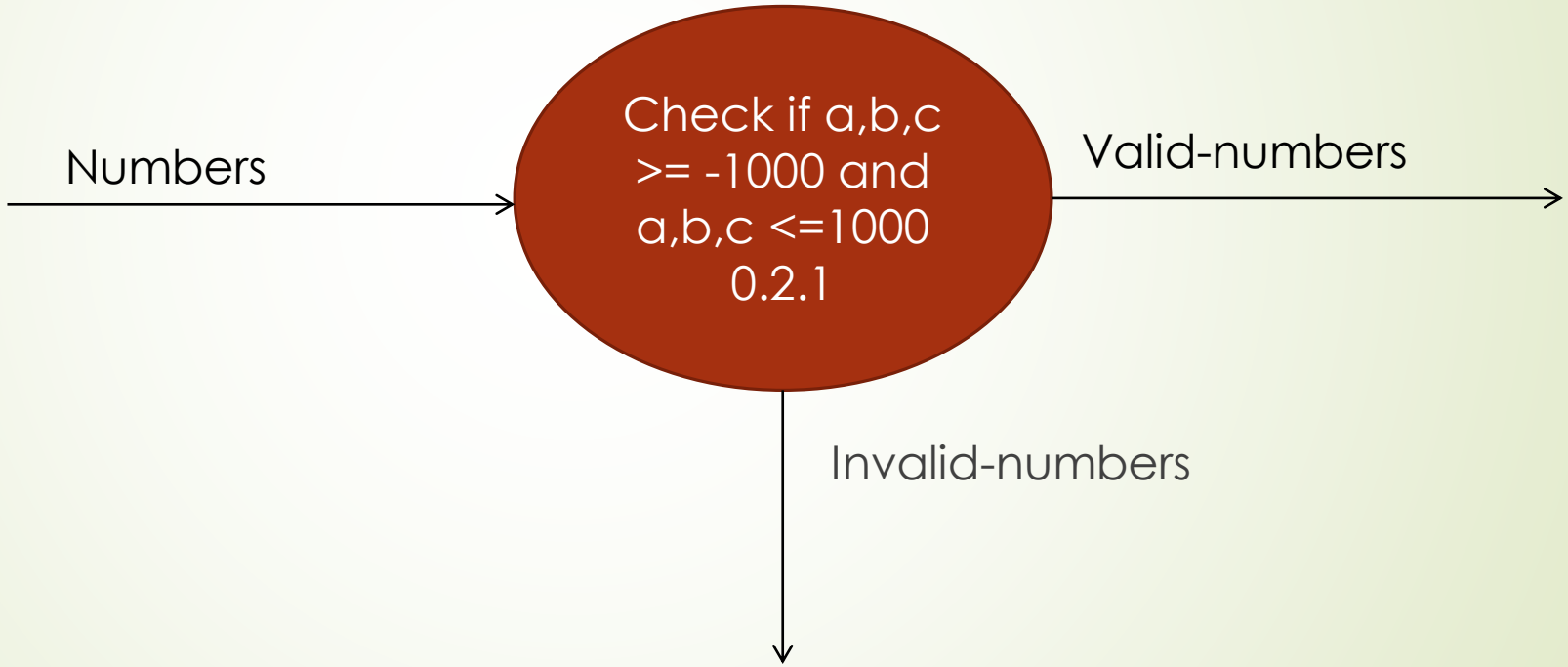
- Context Diagram (Level 0 DFD)

Level 1 DFD

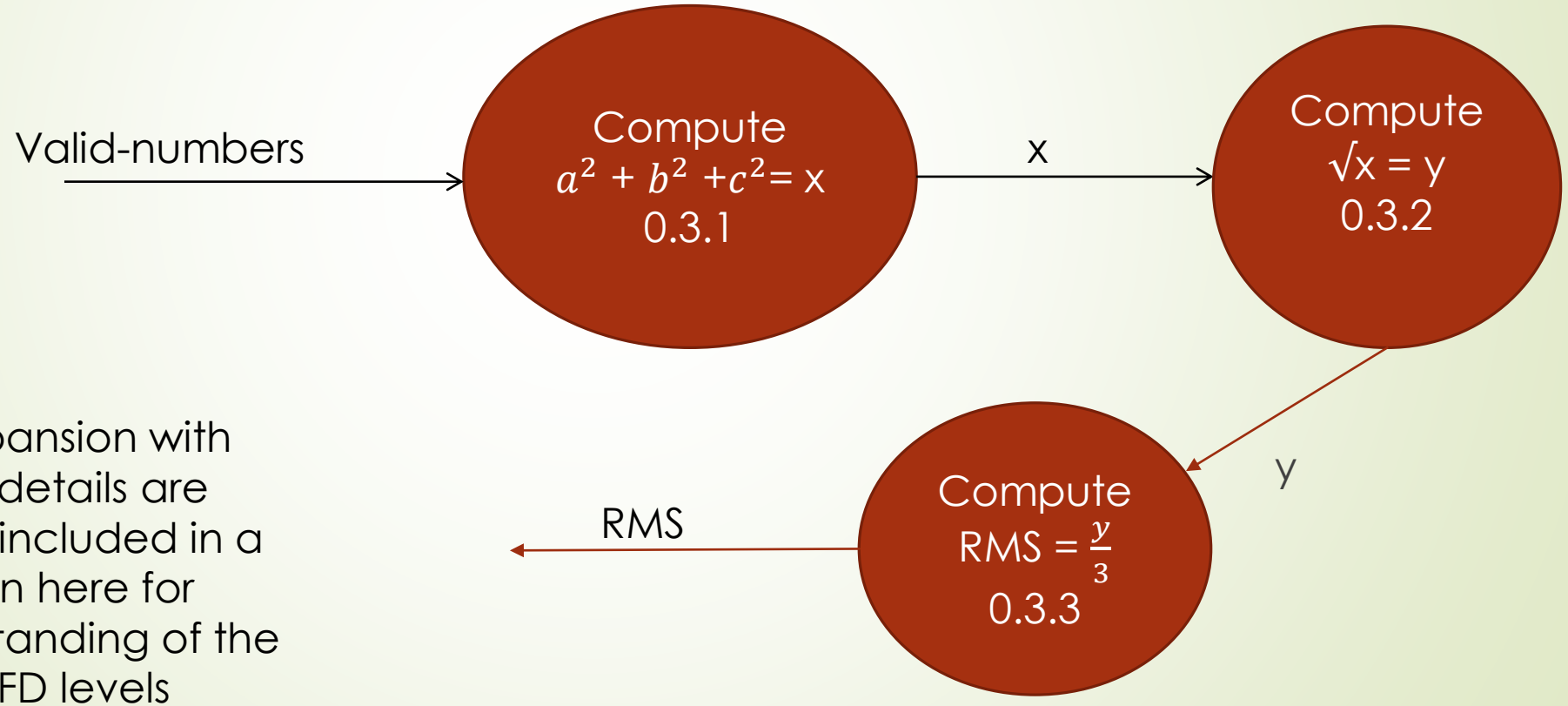

Data-items
Read Numbers 0.1
numbers
Validate Numbers 0.2
error
Valid-numbers
result
Display 0.4
rms
Compute RMS 0.3

Level 2 DFD: Expansion of Read Numbers bubble 0.1

Level 2 DFD: Expansion of Validate Numbers bubble

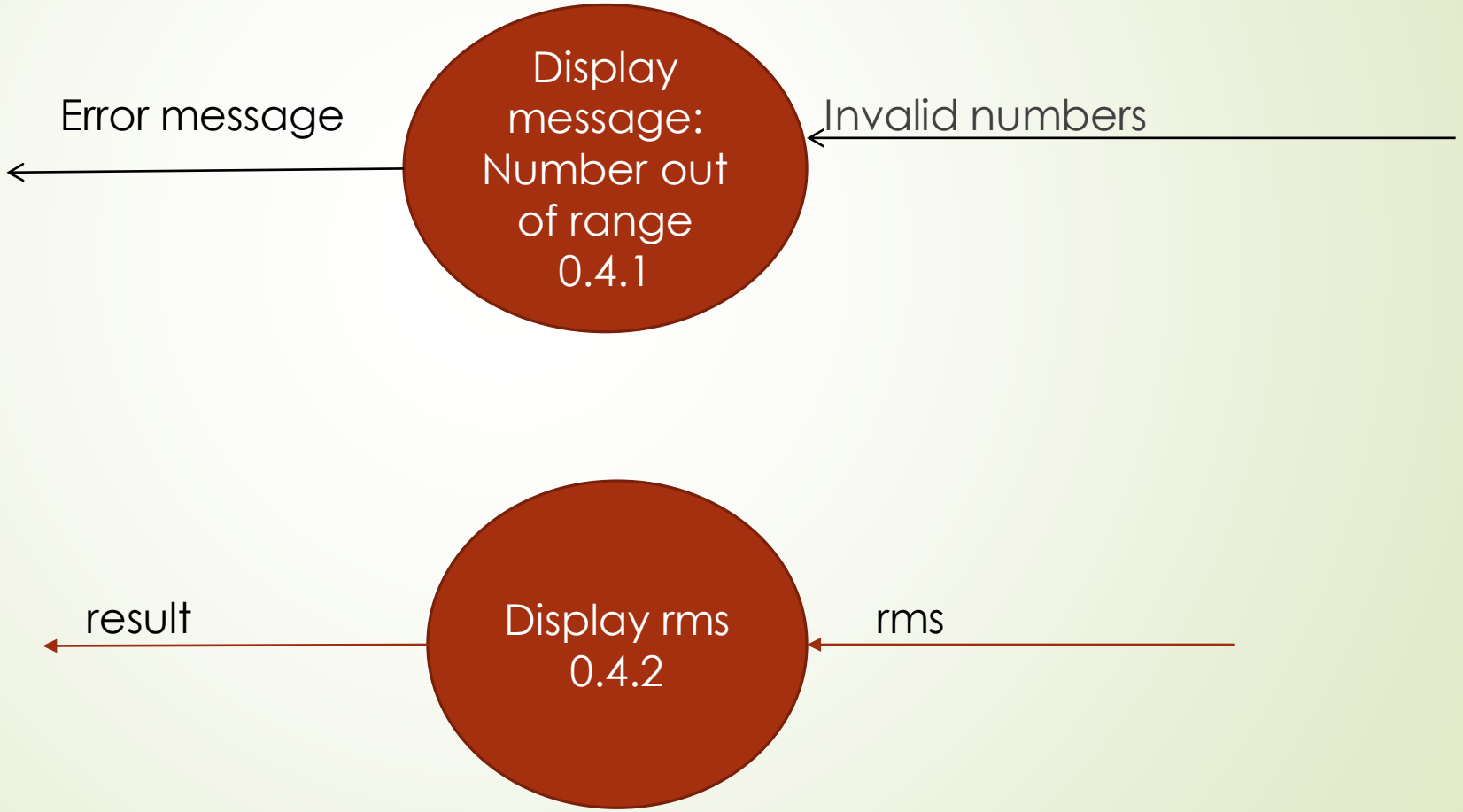


Level 2 DFD: Expansion of Compute RMS bubble 0.3



Note : This expansion with computation details are generally not included in a DFD, it is shown here for better understanding of the subsequent DFD levels

Level 2 DFD: Expansion of display bubble



Data Dictionary

- A DFD is always accompanied by a data dictionary
- A Data Dictionary lists all items appearing in a DFD
- Example:

  Gross Salary=Basic Salary + D.A. + H.R.A – I. Tax

Importance of Data Dictionary

- Provides the team of developers the standard terminology for all data.
- A consistent vocabulary for all data is important
- The absence of Data Dictionary may cause unnecessary confusion

Data Dictionary Conventions

- Composite data are defined in terms of primitive data items using simple operators:
- + : denotes composition of data items
- a + b represents a together with b
- [,,] " represents selection
- Any one of the items inside the square bracket can occur
- E.g. [a,b] denotes either a or b

Data Dictionary Conventions

- (): Contents inside the bracket represents optional data
- a + (b) represents either a + b or a.
- {} : represents iterative data definition,
- {name}5 represents 5 name data
- {name}* represents 0 or more instances
- = : represents equivalence
- E.g. a = b + c represents b and c
- ** : Anything appearing within this is considered a comment

Data Dictionary for RMS Software

- numbers=valid numbers= a+ b + c
- a: integer *input number*
- b: integer *input number*
- c: integer *input number*
- Data-items: a+b+c
- Valid-numbers : a+b+c*integers in the range -1000 to 1000*
- Invalid-numbers : [a,b,c] *integers not in the range -1000 to 1000*
- error: string
- Error message: string
- Results: [RMS, error]
- RMS: integer *root mean square value*

Reference

- Software Engineering by Prof. Rajib Mall