

**Reminder:**

1. In general you should know) What do we mean by software engineering?

Lets use the current definition as promoted by the IEEE Computer Society: It is !) the application

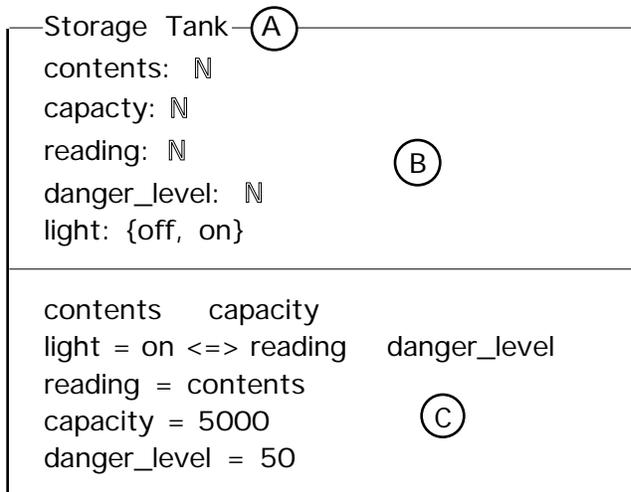
- 9. Operations may be specified in Z by defining their effect on the system \_\_\_\_\_ (Chap11).
- 10. Specifications can be used as building blocks. Specifications should be structured into small, comprehensible which are put together to form more \_\_\_\_\_ specifications (Chap11).
- 11. A Z specification is presented as a number of \_\_\_\_\_ , which may be combined to make new \_\_\_\_\_ (Chap11).
- 12. Describe what the following schema is saying (read the specification to yourself and write down the words that are expressed in the predicate) (Chap11).

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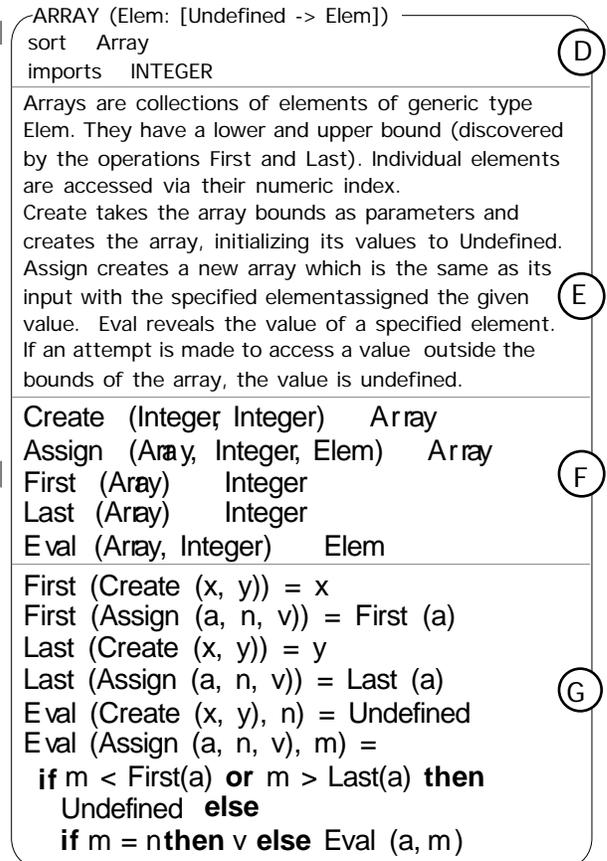
14. Give a diagram showing the range and domain of the function SmallSquare(one 1, three 9, seven 49) and give your definition of the *range* and *domain* of a function (Chap11).

15. Formal specification forces an analysis of the system requirements at an \_\_\_\_\_ (Chap11).

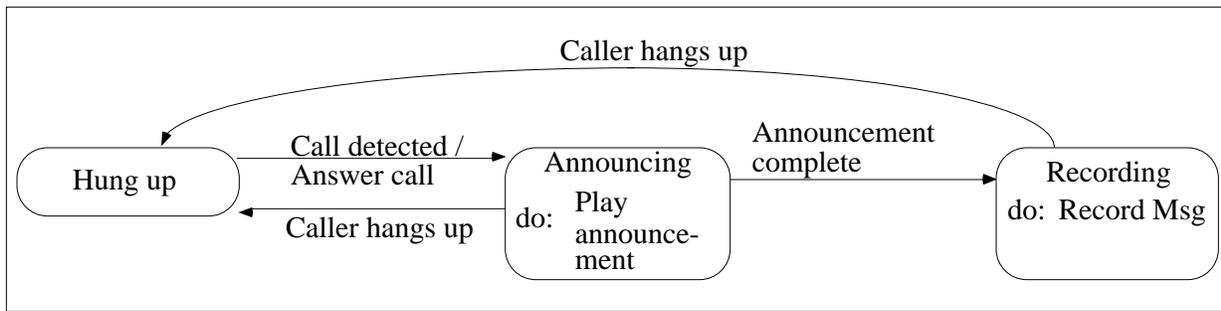
16. Given the two different specifications shown below answer the following questions: (a) name the two types (left one) \_\_\_\_\_ (right one) \_\_\_\_\_. Name the three parts of the specification on the left and the four parts of the specification on the right (Chap11).



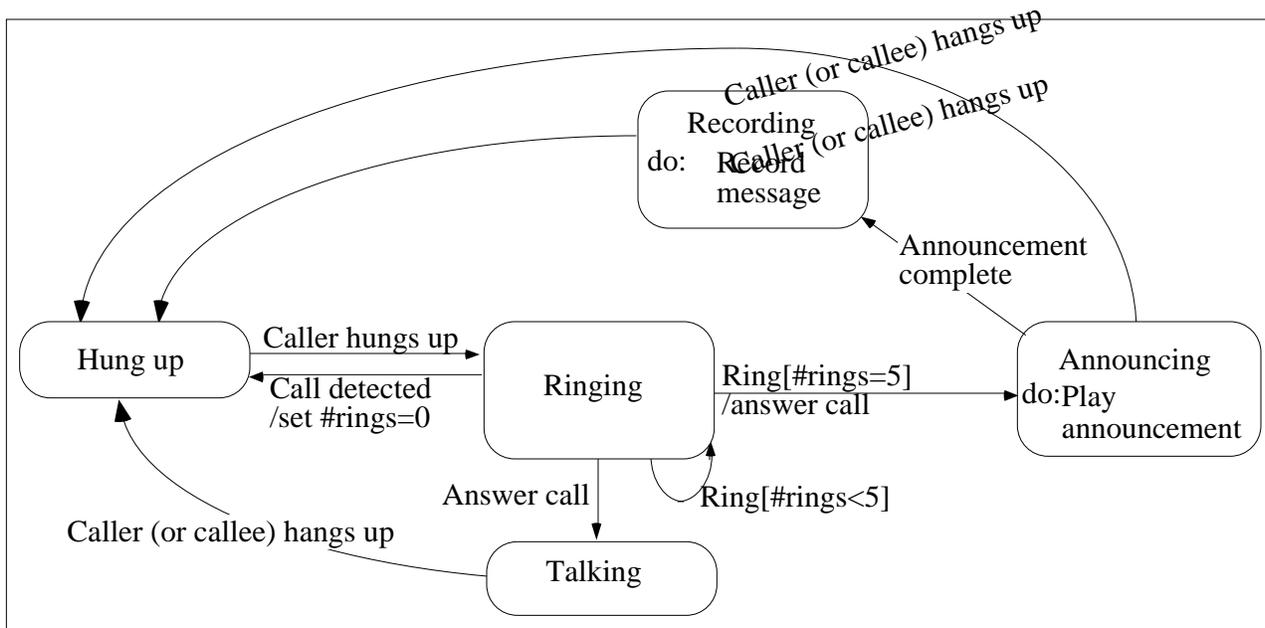
- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_
- E. \_\_\_\_\_
- F. \_\_\_\_\_
- G. \_\_\_\_\_



17. Consider the Telephone Answering Machine (TAM) shown in the diagram below (Chap11).



The TAM above is activated on the first ring. Revise the state diagram so that the TAM answers after five rings. However, if the telephone is answered before five rings, the machine should do nothing (except to allow Talking). Be careful to distinguish between calls where the callee answers before the fifth ring and a call that rings five times.



The process of writing a formal specification based on design artifacts may be called \_\_\_\_\_ [1pt].

Choose one or both of the two types of formal specification methods discussed in Chapter 10 (Algebraic) and Chapter 11 (Zed) and to specify the TAM.

Note, there is definitely one of the two methods more suited for this particular problem (at least from the stand point of how it is described. Think of what is being given to you. Then ask yourself, which method is based on specifying what is fundamentally being provided. First, give your choice of which method most easily maps to the way this problem is stated \_\_\_\_\_ method (if you just skim the two chapters it should become obvious).

## TAM

Machine: {wait, play, record}

Phone : {on\_hook,

Caller : {on\_hook

Ring\_det? : {true, false} --Boolean

Ann\_done? : {true, false}

Ring\_cnt : N

Ring\_cnt' = 0 <=> Caller ==

Ring\_cnt' = Ring\_cnt + 1 <=> Ring\_det == true ^ Phone ==

Machine = play <=> Ring\_cnt = 5 ^ Caller==off\_hook ^ Phone=

Machine = record <=> Ann\_done? ==true ^ Caller==off\_hook

Machine = wait <=> (Caller=) or (Caller==off\_hook ^ Ring\_cnt < 5) or  
 (Caller==off\_hook ^ Phone=)

Explain (in generic terms) what is being said in the first half of this schema and do the same for the second half.

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Algebraic Method (give a simple try and show all four parts):

18. Compare and contrast the four parts in a Zed Schema and the three parts an Algebraic Specification. Describe these elements (i.e., parts) in terms of: syntax, semantics, predicates, (properties), names, types, sort, imports, set of objects, formal and informal, easier to understand. signatures, operations, axioms, and characterize the behavior (Chap10 and 11).

Guaranteed test question (no key will be provided prior to exam)

19. What is Software Cohesion and Software Coupling?

20. How do the terms cohesion and coupling figure in to (i.e., help or hinder) making software systems (a) more adaptable, (b) more extensible *and* (c) more maintainable?

Guaranteed test question (no key will be provided prior to exam).

21. (Chap 12) Name the 3 main types of notation used in design descriptions:

22. (Chap 12-15) Discuss the differences between object oriented and function oriented design.

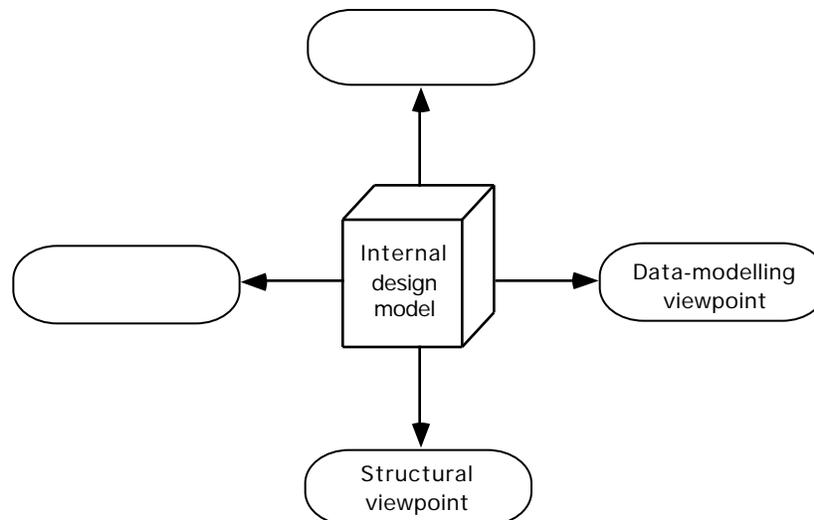
23. (Chap 13) Explain why it may be necessary to design the system architecture before the specifications are written.
24. (Chap 14) Explain why adopting a design approach based on information hiding should lead to a design which may be readily modified?
25. (Chap 15) Data flow diagrams are a means of documenting end-to-end flow through a system. They do not include what?
26. (Project) The design methodology we used in the project is known as SSA/SD which stands for \_\_\_\_\_ . Name the five parts that were delivered in the design notebook (not including the Requirements Traceability Matrix [RTM]). There is some flexibility in terms of the ordering but list them in the order that would be most suitable and appropriate.
- (a)
  - (b)
  - (c)
  - (d)
  - (e)

27. (Handout on design) In expressing your ideas about design, there are three major principles. The roles of representation in capturing, explaining and checking design information include:

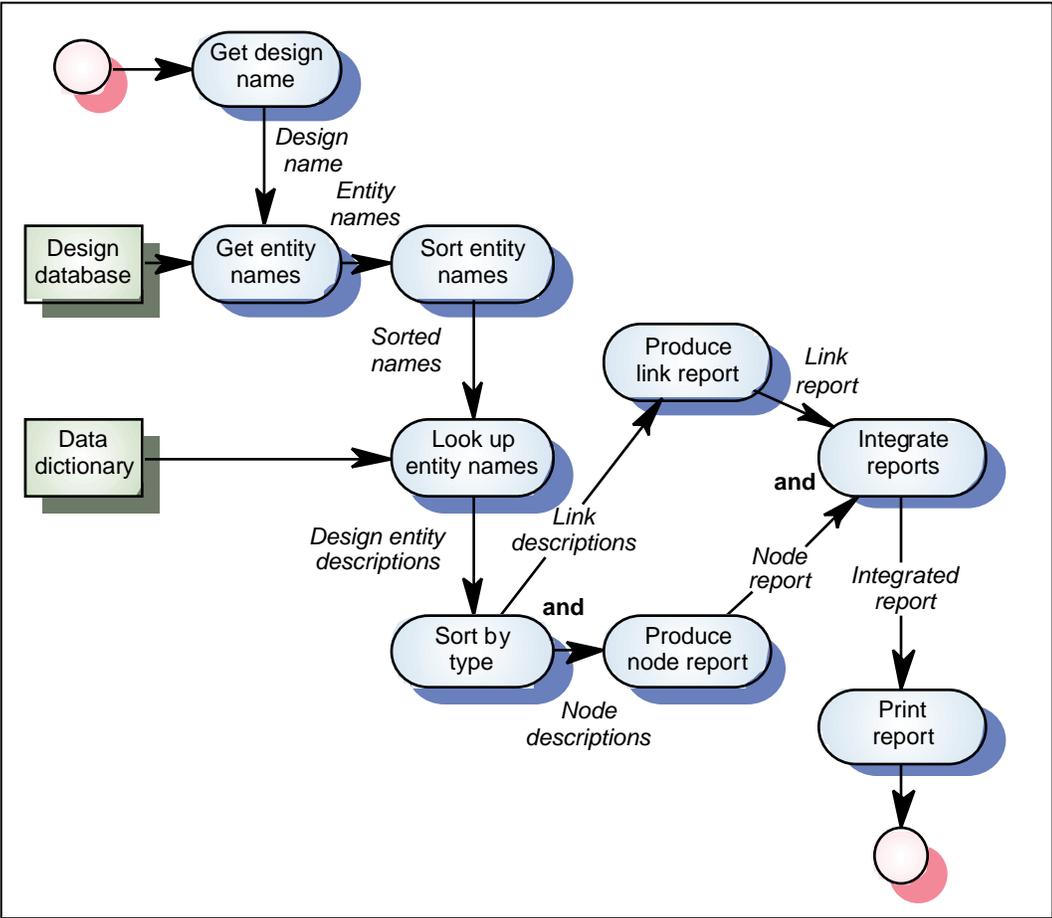
- (a) Capturing the designer's ideas for a solution
- (b) Explaining the designer's ideas to others (customers, implementers and managers).
- (c) Checking for consistency and completeness in a solution.

Design viewpoints for software give a means for capturing a particular set of design attributes. The type of attribute is projected through the use of a representation form of notation.

**Forms of notation:** There are four principal classes of design viewpoints (that use various notations dependent on their inventor). Write in the diagram the missing viewpoints. Guaranteed test question (no key will be provided prior to exam).



28. Structure charts are a way of representing the hierarchical organization of a system. Give a structure chart for Figure 15.3.



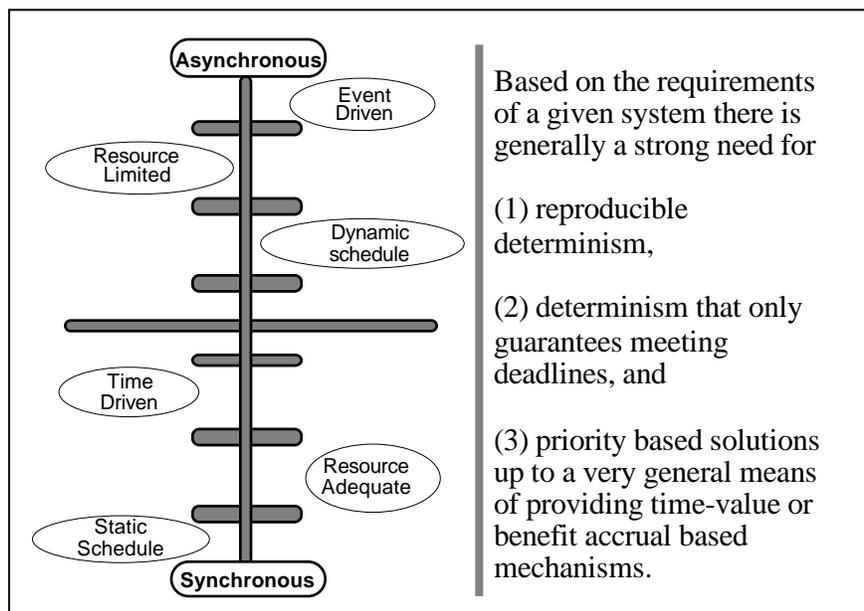
29. (Chap 14) In structural decomposition there are several rules of thumb which may be applied to help the designers (1) Many systems can be considered to have three stages: input some data (perhaps with validation and checking), process the data and then output the data (perhaps in report form); (2) If data validation is required, such functions used to implement the checking should be subordinate to the input function and output formatting follows in this same vein; (3) The role of functions near the top of the structural hierarchy may be to control and coordinate a set of lower-level functions; (4) The objective of the design is to have loosely coupled, highly cohesive components. Functions therefore should do one and only one thing; (5) Each node in the structure chart should have between two and seven subordinates. If there is only one it implies the unit represented by that node may have a low degree of cohesion. Too many subordinates indicates that the design may have been developed to too low a level at this time. Three process steps, which follow these guidelines, can be identified for the transformation process from data-flow diagrams to structure charts. Name the three steps:

- (a) \_\_\_\_\_
- (b) \_\_\_\_\_
- (c) \_\_\_\_\_

30. (Chap 16) A real-time system is a software system that must \_\_\_\_\_ to events in real-time. The correctness does not only depend on the accuracy of the results the system produces, but also on the \_\_\_\_\_ when these results are produced.

31. (Chap 16) There are two different types of real-time systems \_\_\_\_\_ systems and \_\_\_\_\_ systems. Explain the difference between the two.

32. Show where these two different types of real time systems fit within the gradient shown in the figure below (Chap 16). Guaranteed test question (no key will be provided prior to exam).



33. (Chap 17) To study for this chapter carefully review the key points (slides 57-58). Pay particular attention to the following slides (suggest that you write down some thoughts [and specific details] about each of those slides here below):

Slide 9

Slide 11-12

Slide 21-23

Slide 31

Slide 33

Slide 37-38

Slide 46

Slide 48-49

Slide 56

Slide 57-58