CS6403 Software Engineering

Tutorial -1

(Scope of SW Engg, Process models)

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Chocoholics Anonymous
(Case study adapted from Schach)

Chocoholics Anonymous (ChocAn) is an organization dedicated to helping people addicted to chocolate in all its glorious forms. Members pay a monthly fee to ChocAn. For this fee they are entitled to unlimited consultations and treatments with health care professionals, namely, dietitians, internists, and exercise experts. Every member is given a plastic card embossed with the member's name and a nine-digit member number and incorporating a magnetic strip on which that information is encoded. Each health care professional ( *provider* ) who provides services to ChocAn members has a specially designed ChocAn computer terminal, similar to a credit card device in a shop. When a provider's terminal is switched on, the provider is asked to enter his or her provider number.

To receive health care services from ChocAn, the member hands his or her card to the provider, who slides the card through the card reader on the terminal. The terminal then dials the ChocAn Data Center, and the ChocAn Data Center computer verifies the member number. If the number is valid, the word Validated appears on the one-line display. If the number is not valid, the reason is displayed, such as Invalid number or Member suspended; the latter message indicates that fees are owed (that is, the member has not paid membership fees for at least a month) and member status has been set to suspended.

To bill ChocAn after a health care service has been provided to the member, the provider again passes the card through the card reader or keys in the member number. When the word Validated appears, the provider keys in the date the service was provided in the format MM–DD–YYYY. The date of service is needed because hardware or other difficulties may have prevented the provider from billing ChocAn immediately after providing the service. Next, the provider uses the Provider Directory to look up the appropriate six-digit service code corresponding to the service provided. For example, 598470 is the code for a session with a dietitian, whereas 883948 is the code for an aerobics exercise session. The provider then keys in the service code. To check that the service code has been correctly looked up and keyed in, the software product then displays the name of the service corresponding to the code (up to 20 characters) and asks the provider to verify that this is indeed the service that was provided. If the provider has entered a

nonexistent code, an error message is printed. The provider also can enter comments about the service provided.

The software product now writes a record to disk that includes the following fields:

Current date and time (MM–DD–YYYY HH:MM:SS).
Date service was provided (MM–DD–YYYY).
Provider number (9 digits).
Member number (9 digits).
Service code (6 digits).
Comments (100 characters) (optional).

The software product next looks up the fee to be paid for that service and displays it on the provider's terminal. For verification purposes, the provider has a form on which to enter the current date and time, the date the service was provided, member name and number, service code, and fee to be paid. At the end of the week, the provider totals the fees to verify the amount to be paid to that provider by ChocAn for that week.

At any time, a provider can request the software product for a Provider Directory, an alphabetically ordered list of service names and corresponding service codes and fees. The Provider Directory is sent to the provider as an e-mail attachment.

At midnight on Friday, the main accounting procedure is run at the ChocAn Data Center. It reads the week's file of services provided and prints a number of reports. Each report also can be run individually at the request of a ChocAn manager at any time during the week.

Each member who has consulted a ChocAn provider during that week receives a list of services provided to that member, sorted in order of service date. The report, which is also sent as an e-mail attachment, includes:

Member name (25 characters).
Member number (9 digits).
Member street address (25 characters).
Member city (14 characters).
Member state (2 letters).
Member ZIP code (5 digits).
For each service provided, the following details are required:
    Date of service (MM–DD–YYYY).
    Provider name (25 characters).
    Service name (20 characters).

Each provider who has billed ChocAn during that week receives a report, sent as an e-mail attachment, containing the list of services he or she provided to ChocAn members. To simplify the task of verification, the report contains the same information as that entered on the provider's form, in the order that the data were received by the computer. At the end of the report is a summary including

the number of consultations with members and the total fee for that week. That is, the fields of the report include:

Provider name (25 characters).
Provider number (9 digits).
Provider street address (25 characters).
Provider city (14 characters).
Provider state (2 letters).
Provider ZIP code (5 digits).
For each service provided, the following details are required:
    Date of service (MM–DD–YYYY).
    Date and time data were received by the computer (MM–DD–YYYY HH:MM:SS).
    Member name (25 characters).
    Member number (9 digits).
    Service code (6 digits).
    Fee to be paid (up to $999.99).
Total number of consultations with members (3 digits).
Total fee for week (up to $99,999.99).

A record consisting of electronic funds transfer (EFT) data is then written to a disk; banking computers will later ensure that each provider's bank account is credited with the appropriate amount.

A summary report is given to the manager for accounts payable. The report lists every provider to be paid that week, the number of consultations each had, and his or her total fee for that week. Finally, the total number of providers who provided services, the total number of consultations, and the overall fee total are printed.

During the day, the software at the ChocAn Data Center is run in interactive mode to allow operators to add new members to ChocAn, to delete members who have resigned, and to update member records. Similarly, provider records are added, deleted, and updated.

The processing of payments of ChocAn membership fees has been contracted out to Acme Accounting Services, a third-party organization. Acme is responsible for financial procedures such as recording payments of membership fees, suspending members whose fees are overdue, and reinstating suspended members who have now paid what is owing. The Acme computer updates the relevant ChocAn Data Center computer membership records each evening at 9 P.M.

Your organization has been awarded the contract to write only the ChocAn data processing software; another organization will be responsible for the communications software, for designing the ChocAn provider's terminal, for the software needed by Acme Accounting Services, and for implementing the EFT component. The contract states that, at the acceptance test, the data from a

provider's terminal must be simulated by keyboard input and data to be transmitted to a provider's terminal display must appear on the screen. A manager's terminal must be simulated by the same keyboard and screen. Each member report must be written to its own file; the name of the file should begin with the member name, followed by the date of the report. The provider reports should be handled the same way. The Provider Directory must also be created as a file. None of the files should actually be sent as e-mail attachments. As for the EFT data, all that is required is that a file be set up containing the provider name, provider number, and the amount to be transferred.

1. Which software life-cycle model would you use for the Chocoholics Anonymous product? Give reasons for your answer.
   The iterative-and-incremental life-cycle model should be used. First, it offers multiple opportunities for checking that the software product is correct. Second, the robustness of the underlying architecture can be determined relatively early in the life cycle. Third, risks can be mitigated early. Fourth, there is always a working version of the software.

2. What differences would you expect to find if the Chocoholics Anonymous product were developed by an organization at CMM level 1, as opposed to an organization at level 5?
   It is likely to take longer, cost more, be delivered with residual faults, and be difficult to maintain.

3. What type of team organization would be appropriate for developing the Chocoholics Anonymous product?
   All of the team organizations in Chapter 4 should work well on this project. The problem with the democratic team structure is that it cannot be externally imposed.

4. Suppose that the product for Chocoholics Anonymous of Appendix A has been implemented exactly as described. Now the product has to be modifi ed to include endocrinologists as providers. In what ways will the existing product have to be changed? Would it be better to discard everything and start again from scratch?
   The product should have been designed with an architecture that will allow modifications to be made to one component without significantly disrupting other components of the product. In particular, it should be possible to add an additional type of provider. This is a relatively simple task, and is clearly better than starting again from scratch.

5. Why is it not possible to estimate the cost and duration purely on the basis of the information provided here?

It is an informal statement of the client's requirements. Until a specification document has been drawn up, a cost or duration estimate is likely to be widely inaccurate.