**COMP 370 – Software Engineering**  
**Term Project**  
Problem 12.20

Question: (Term Project) Using the technique specified by your instructor, draw up a specification document for the Chocoholics Anonymous product described in Appendix A.

1. **Draw the data flow diagram**

To simplify the data flow diagram, it is drawn in three parts. Data stores and external agents are repeated, but there is only one instance of each process. The data flow diagrams appear in Figures 1.1, 1.2 and 1.3.

**Figure 1.1: Part 1 of data flow diagram for Chocoholics Anonymous**



**Figure 1.2: Part 2 of data flow diagram for Chocoholics Anonymous**



**Figure 1.3: Part 3 of data flow diagram for Chocoholics Anonymous**



1. **Decide what sections to computerize, and how.**

All processes shown in the Data Flow Diagram (DFD) will be computerized. A central database is required, and will be installed on a server at the ChocAn Data Center. Client/Server architecture is required for online implementation of the processes shown in Part 1 of the DFD (maintenance of the database by a ChocAn operator). The processes in Part 2 of the DFD will be implemented using provider terminals that interact with the server via a dial-up modem. The processes shown in Part 3 of the DFD will be implemented firstly as batch processes that will be run at midnight each Friday. This is indicated by the dashed lines (control flows) in the DFD. Secondly, a single report can be generated at any time interactively on request by the ChocAn manager from a client workstation.

1. **Determine the Details of the Data Flows.**

Provider\_details:

* Provider number (max 9 digits) – Generated by system, may not be changed.
* Provider name (max 25 characters)
* Provider street address (max 25 characters)
* Provider city (max 14 characters)
* Provider province (2 letters)
* Provider Zip Code (7 digits)
* Provider email address (max 50 characters)
* Provider type (1 letter) – Dietitian (D), Internist (I) or Exercise Specialist (E)

Provider\_updates:

* For a new Provider:
  + provider details excluding provider number
* To update an existing provider:
  + Existing provider number
  + Update provider details excluding provider number
* To delete an existing provider:
  + Provider number
* Updated\_provider\_details:
  + Provider\_details

Member\_details:

* Member number (max 9 digits) – Generated by system, may not be changed.
* Member name (max 25 characters)
* Member street address (max 25 characters)
* Member city (max 14 characters)
* Member province (2 letters)
* Member Zip Code (7 digits)
* Member email address (max 50 characters)
* Member status (1 letter) – Active (A) or Suspended (S)

Member\_updates:

* For a new member:
  + member details excluding member number
* To update an existing member:
  + Existing member number
  + Update member details excluding member number
* To delete an existing member:
  + member number
* Updated\_member\_details:
  + member\_details

Service\_Details:

* Service code (max 6 digits)
* Service name (max 20 characters)
* Service fee (4+2 digits)

Service\_Updates:

* For a new service:
  + service details
* To update an existing service:
  + Existing service code
  + Update service details
* To delete an existing service:
  + Service code
* Updated\_service\_details:
  + Service\_details

Claims\_Details:

* Submission data and time (19 characters, format MM-DD-YYY HH:MM:SS)
* Service date (10 characters, format MM-DD-YYYY)
* Provider number (max 9 digits)
* Member number (max 9 digits)
* Service code (max 6 digits)

Claim\_Updates:

* For a new claim:
* Claim\_details
* Verified\_provider\_number:
  + Provider\_number
* Verified\_member\_number:
  + Member\_number
* Verified\_service\_details:
  + Service\_details
* Verified\_claim:
  + Claim\_details

Provider\_directory:

* Provider\_directory \_request (1 character)
* Provider\_directory:
  + For each service, alphabetically ordered according to service name:
    - Service name (max 20 characters)
    - Service code (max 6 digits)
    - Service fee (4+2 digits)

Provider\_report\_request:

* Provider number (max 9 digits)
* End date of week (10 characters, format MM-DD-YYYY)
* Provider\_report:
  + Provider name (max 25 characters)
  + Provider street address (max 25 characters)
  + Provider city (max 14 characters)
  + Provider province (2 letters)
  + Provider Zip Code (7 digits)
  + For each service provided, sorted according to claim submission Date and time:
    - Service date (10 characters, format MM-DD-YYYY)
    - Submission date and time (19 characters, format MM-DD-YYY HH:MM:SS)
    - Member name (max 25 characters)
    - Member number (max 9 digits)
    - Service code (max 6 digits)
    - Service fee (4+2 digits)
    - Total number of consultations (3 digits)
    - Total fee for week (5+2 digits)

Member\_report\_request:

* Member number (max 9 digits)
* End date of week (10 characters, format MM-DD-YYYY)
* Member\_report:
  + Member name (max 25 characters)
  + Member number (max 9 digits)
  + Member street address (max 25 characters)
  + Member city (max 14 characters)
  + Member province (2 letters)
  + Member Zip Code (7 digits)
  + For each service provided, sorted according to service date:
    - Service date (10 characters, format MM-DD-YYYY)
    - Provider name (max 25 characters)
    - Service name (max 20 characters)

Accounts\_payable\_report:

* For each provider to be paid that week:
  + Provider name (max 25 characters)
  + Number of consultations (max 3 digits)
  + Total fee (5+2 digits)
  + Total number of providers
  + Overall total fee (6+2 digits)
  + EFT\_data for each provider to be paid:
    - Provider name (max 25 characters)
    - Provider number (max 9 digits)
    - Total fee for week (5+2 digits)

1. **Define Logic of Processes**

Maintain provider

* + To add a new provider:
    - Insert the provider details excluding provider number into the database.
    - The database must generate a provider number for the new provider.
  + To update an existing provider:
    - Search for the existing provider using the provider number.
    - Update the provider details.
  + To delete an existing provider:
    - Search for the existing provider using the provider number.
    - Delete the provider details.

Maintain member

* + To add a new member:
    - Insert the member details excluding member number into the database.
    - The database must generate a member number for the new member.
  + To update an existing member:
    - Search for the existing member using the member number.
    - Update the member details.
  + To delete an existing member:
    - Search for the existing member using the member number.
    - Delete the member details.

Maintain Service

* + To add a new service:
    - Insert the service details into the database.
  + To update an existing service:
    - Search for the existing service using the service code.
    - Update the service details.
  + To delete an existing service:
    - Search for the existing service using the service code.
    - Delete the service details.

Verify Provider

* + Search for the provider number in the database.

Verify Member

* + Search for the member number in the database.
  + Determine if the member status is Active.

Process Claim

* + Search for the service code in the database.
  + Insert the verified claim into the database.

Generate Provider Directory

* + Extract provider directory data from the database.

Generate EFT data

* + Extract EFT data from the database.

Generate Provider Report

* + Extract provider report data from the database.

Generate Member Report

* + Extract member report data from the database.

Generate Accounts Payable Report

* + Extract accounts payable report data from the database.

1. **Define the data stores.**

PROVIDERS DATA

* + Provider details – defined in step 3.

MEMBERS DATA

* + Member details – defined in step 3.

SERVICES DATA

* + Service details – defined in step 3.

CLAIMS DATA

* + Claim details – defined in step 3.

1. **Define physical resources.**Use a relational database with a separate table for each of the data stores defined above.

PROVIDER TABLE

* + Primary key: provider\_number

MEMBER TABLE

* + Primary key: member\_number

SERVICE TABLE

* + Primary key: service\_code
  + Secondary index: service\_name

CLAIM TABLE

* + Primary key: submission\_date\_and\_time
  + Foreign Key: provider\_number
  + Foreign Key: member\_number
  + Foreign Key: service\_code
  + Secondary index: service\_date

1. **Determine input/output specifications.**The content of input screens and reports and the format of fields have been determined in step 3.

Input screens will be designed for the following processes:

(ChocAn operator interface)

* + maintain provider
  + maintain member
  + maintain service

(ChocAn manager interface)

* generate provider report
* generate member report
* generate accounts payable report

A web -based interface (user dialogue for the provider terminal) will be designed for the following processes:

* verify provider (when the terminal is switched on)
* verify member
* process claim
* request provider directory

The layout of the following reports will be designed:

* provider report
* member report
* accounts payable report
* provider directory

The exact format of the EFT data must be determined for the following process:

* generate EFT data

1. **Perform Sizing.**

Database:

* Provider table: approximately 124 to 132 bytes for each record. ChocAn has about 100 providers currently and expects a growth of 10%. Thus the provider table needs approximately 15 Kilobytes of storage.
* Member table: record sizes are equivalent to provider records. ChocAn has about 1000 members currently and expects a growth of 20%. Thus the member table needs approximately 160 Kilobytes of storage.
* Service table: approximately 32 types for each record. There are currently 50 different services available. Making provision for a growth of 25%, approximately 2 Kilobytes of storage are required.
* Claim table: approximately 52 bytes for each record. On average, each member visits a provider twice a week. The expected number of claims per year is thus 124800. Approximately 7 Megabytes are required for the claim table.

Software:

* A Database Management System (DBMS) can require 10 to 500 MB, or more, of storage.
* The application programs that must run on the server will require approximately 2 MB of storage. Middleware is also necessary so that the server and clients can interact. This will also require a few megabytes of storage.
* Assuming a DBMS of approximately 75 MB, 100 MB of storage on the server should be sufficient. Client workstations need only enough storage to run the interface programs. This will be only a few megabytes. Provider terminals will need at least 10 MB of storage space because the software will include a web-based graphical user interface.

1. **Determine the Hardware Requirements.**

One server will be required for the database. At least two terminals are needed for ChocAn operator for the maintenance of data, and at least one more is needed for the manager to run reports. At least one printer will be needed for the manager to print reports. Each provider will need a provider terminal. It is assumed that each provider will use his own computer to receive email, including provider reports and the provider directory.