

MAHARAJA COLLEGE'S GYMNASIUM (MCG)  
SYSTEM DESIGN PROPOSAL

EMERGENCE OF DESIGN

To get a better perspective on the STS project, Sarita and Anil prepared a functional diagram, depicted in Figure D-1. This diagram, combined with a thorough review of their study facts gathered during systems analysis phase (Ref: MCG Cases (B) & (C)) began to merge together helping to form building blocks, giving rise to several design issues.

DESIGN ISSUES

Sarita had told Anil on several occasions, "The right hand doesn't know what the left hand is doing, at the gymnasium. Moreover, they need a system that will integrate their activities. Otherwise they will be doomed".

"Yes, I know", Anil responded, "They're trying but they don't know how to go about it".

"Also, we've got to think about users' level of expertise. Most of them will be unskilled. Therefore the user/system interface must be carefully planned."

"They better start getting serious" said Anil. "The municipality is building its own general purpose auditorium, so competition is bound to increase".

"They're getting some information now, if you want to call it (but it's not usable. It's too late, so it is no way better than zero information. The timeliness for information seems to me to be a vital consideration in design. And for them timely information is key to be able to compete," said Sarita.

I'm sure we'll be able to meet the systems requirements. The idea of building system's bridge to other businesses for ticket sales is a good one, though I believe it's a little premature at this stage of the design," said Anil.

"Yes, First things first," Sarita agreed, "but we can direct out designs towards enabling this kind of bridging if they want to go that way in the future.

"If they approve the kind of systems design I have in mind, data processing requirements will be very easy," said Anil.

"You know, I've been thinking," said Sarita, "the gymnasium is just like any other service. Sometimes, I tend to look at systems differently if they are in an academic setting; but in reality all systems can pretty much be described in the flow of people, materials and data. The gymnasium is organised along divisional lines and has decentralised management because Gupta lets them run their own areas."

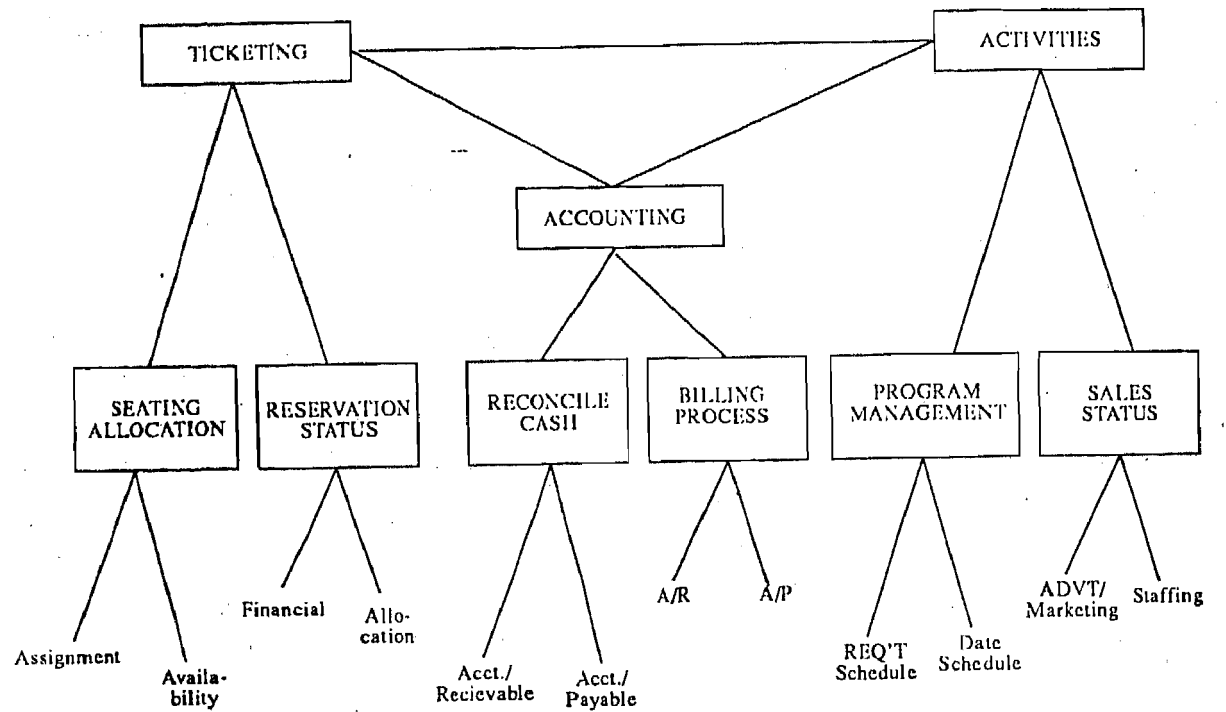


Figure D-1 : STS Design Levels

"That's true. It's just a typical business organisation.

"Something else **that's** really going to affect us is the cost-effectiveness. All the top people and **especially** the Management Committee are coming **down hard** on cost-effectiveness. I overheard Mr. **Gupta** tell **Neera** that though the Committee has **allocated** the money in the budget, but they're not going to approve anything unless it's **cost-effective**."

"**Most of the time** they just look at costs. That is, if it **costs less than they** are saving money, and **that's** not **always** true. Sometimes, cutting costs is the worst decision.

"You bet," agreed Sarita. "Just **look** at what they're done over at the **gymnatorium**. They haven't spent much money, and **look how** they are just **scraping** through.

"**I totally agree**," Sarita said. "**They're** really have a morale problem there. A few people told me they **were** leaving. They **just** can't **take** the hassling and confusion any more."

We may **look** like real **heroes** when this **is over**," Anil said enthusiastically.

"**If they can keep** the right kind of people on **staff**, I agree. We can do some **good things** for them, but **we're** getting ahead of ourselves. **First**, we've got to come up with some viable designs for **them** to look at, and go **from there**. And what will make **them** viable is to **consider** and be aware of the design issues we've **been discussing**."

Sarita and Anil **continued** to weigh the impact of design issues on their design **conceptualisations**. From **what they had learnt** so far, it indicated to **them some design issues** should be **weighed heavily** in the design process. Their design issues weighting scheme is shown in **EXHIBIT D-1**.

**EXHIBIT D-I**  
**WEIGHTING SCHEME FOR DESIGN ISSUES PERTAINING**  
**TO GYMNASIUM**

System Design Proposal

DESIGN FORCE	DESCRIPTION	WEIGHTING FACTORS (Total 100)
Integration	<ul style="list-style-type: none"> <li>* Needed among accounting, activities and ticketing</li> <li>* <b>Users</b> need ready access to system</li> </ul>	15
Users/System Interface	<ul style="list-style-type: none"> <li>* Many <b>users</b> are novices</li> <li>* Need ease of <b>use</b> and limited training</li> <li>* Automatic Monitoring and reporting</li> </ul>	15
Competitive Forces	<ul style="list-style-type: none"> <li>* <b>Pooled</b> and sharing of resources</li> <li>* Concurrent ticketing for <b>several</b> program</li> <li>* Need for <b>immediate access</b> to ticketing information</li> <li>* <b>Patron</b> mailing list for promotion</li> <li>* Service to Promoters of programs</li> <li>* Extend reach into northern part of bordering state</li> </ul>	10
Information Quality and Usability	<ul style="list-style-type: none"> <li>* Timely and accurate seating availability</li> <li>* Timely and accurate ticket disbursement</li> <li>* Timely and accurate details for tickets disbursed</li> </ul>	10
Systems Requirements	<ul style="list-style-type: none"> <li>* Reliability goal is 100 percent in scheduling programs and ticket sales</li> <li>* Availability <b>goal</b> is 100 percent to all users.</li> <li>* Flexibility <b>goal</b> is to extend ticket selling into <b>selected</b> businesses in north-western region in the country</li> <li>* Installation schedule is targeted at the end of next quarter</li> <li>* Life expectancy is <b>set</b> for <b>five years</b> with 100 percent <b>growth potential</b></li> <li>* Maintainability is ensured by use of structured design standards <b>documentation</b> and modular programming</li> </ul>	10
Data Processing Requirements	<ul style="list-style-type: none"> <li>* Volume is <b>over</b> 2 million <b>separate transactions</b> per year with <b>projections</b> on <b>nearly</b> 4 million within five years</li> <li>* <b>Complexity</b> involves scheduled of events and matching <b>resources</b> to support each event</li> <li>* Time <b>constraints</b> for maximum productivity require online real-time processing</li> <li>* <b>Computational</b> demands are relatively low</li> </ul>	5
Organisational Factors	<ul style="list-style-type: none"> <li>* <b>Nature</b> of the gymnasium's business <b>makes</b> proper scheduling and ticket selling an integral part of <b>its</b> operation</li> <li>* Type is divisional which <b>facilitates reporting requirements</b></li> <li>* Size of <b>the</b> gymnasium is one of the largest in the country <b>that</b> can <b>accommodate</b> a wide variety of programs</li> <li>* Structure is a <b>stand-alone</b> operation with <b>limited</b> ties <b>directly</b> to Maharaja College so for <b>all intents</b> and <b>purposes</b> <b>the</b> gymnasium <b>is</b> to be run <b>like any other</b> profit-making business</li> <li>* <b>Management</b> style is <b>decentralized</b>.</li> </ul>	5
Cost Effectiveness	<ul style="list-style-type: none"> <li>* More efficient ticket disbursement with fewer <b>staff</b></li> <li>* Must be developed for current staff</li> </ul>	10

	<ul style="list-style-type: none"><li>* Management Committee require a formal cost-effectiveness report</li><li>* An audit is <b>conducted</b> 6 and 12 months after implementation to verify <b>cost-effectiveness</b> analysis</li></ul>	
Human Factors	<ul style="list-style-type: none"><li>* Ease of use</li><li>* Users have feeling they are in control</li><li>* Reduce frustration in dealing with angry <b>patrons</b></li><li>* <b>Raise</b> Morale</li></ul>	15
Feasibility Requirements	<ul style="list-style-type: none"><li>* Technical feasibility is not a problem</li><li>* Economic pressures are to stay <b>within budget</b></li><li>* Legal impact means safeguarding <b>patron</b> and promoter <b>data</b></li><li>* Operational <b>means</b> the present staff and future personnel with limited expertise must be able to <b>use</b> the system with limited training</li></ul>	5

PREPARING A DATA FLOW DIAGRAM

Sarita had prepared a data flow diagram (DFD) of the present system. It is displayed in Figure D-2. Form this model, she and Anil developed a number of models on a CASE based workstation. The one they finally selected is illustrated in Figure D-3.

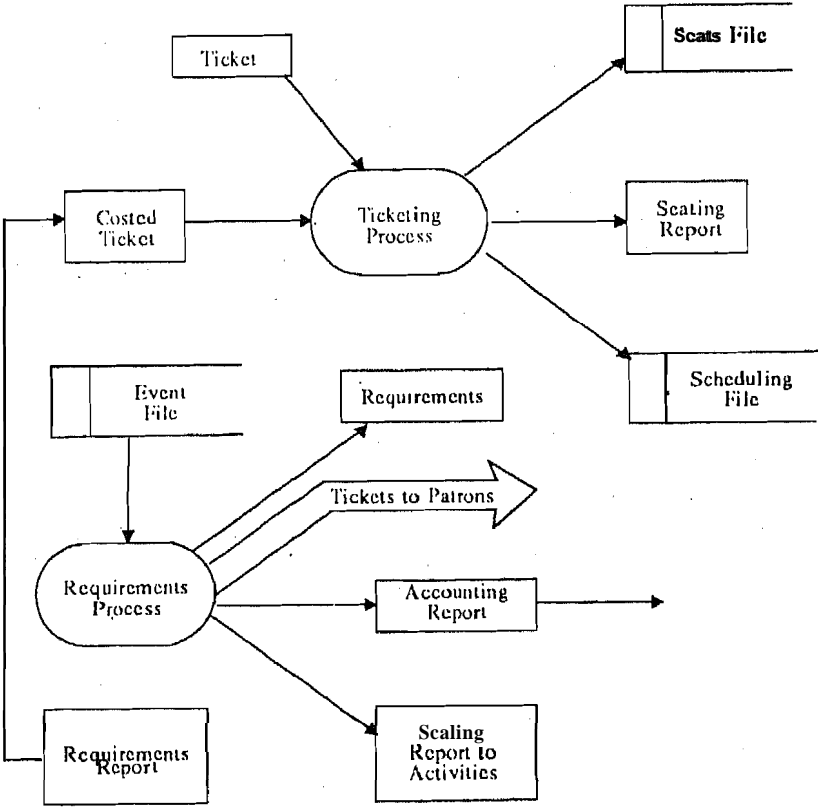


Figure D-2: Data Flow diagram of the present ticketing process

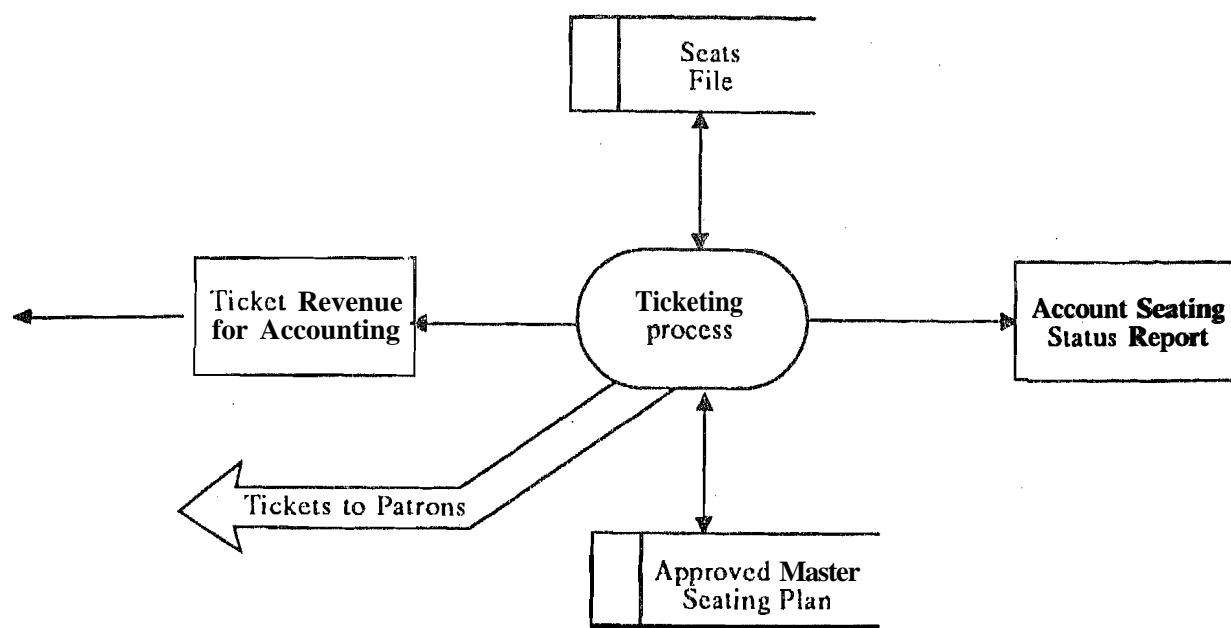


Figure 0-3 : Proposed data flow diagram for the ticketing process.

### ASSIGNMENT

1. Consider yourself to be in place of Sarita and Anil come up with a systems design proposal report with three design alternatives, viz.
  - a) The Stand-alone Batch Alternative
  - b) The Network Based Alternative
  - c) The Centralized Alternative

SYSTEMS DESIGN PROPOSAL REPORT

Month XX, 19xx

To : All Divisional Heads  
From : Sarita Kakkar, Chief Systems Analyst  
Subject : Scheduling and Ticketing System STS  
Copies : Mukul Gupta, Gymnatorium Director and Neera Tiwari, EDP Manager

DESIGN IMPERATIVE:

The present system does not meet the information and accounting control needs of the gymnatorium. Present operations are confusing and inefficient from all users and stakeholders viewpoints. For business continuity and to support a major expansion, it is imperative that new, viable systems be considered for further evaluation and sign and implementation.

Possible Systems Design Models

We have prepared three general models for your consideration. We do not recommend one over the other. They all are viable based on our work up to this point. The one or ones you select or a combination thereof, will be evaluated further as to the best technology platform available to support the designs. Once we have defined precisely all the resources necessary to implement the cost-effectiveness analysis to determine the one that yields the best effectiveness-to-cost ratio.

The three general systems design alternatives can be classified as (1) stand-alone batch alternative (2) network-based alternative and (3) centralized alternative. The building blocks of each system are described in the following pages.

1. THE STAND-ALONE BATCH ALTERNATIVE  
Building Block Design Sheet

COMPANY : MCG  
SYSTEM : STS

INPUT :

- Program - Input Sheet
- Ticket Sales Recap Sheet
- Resources Available Input Sheet
- Ticket Sales Revenue Log
- Program Expenses
- Ticket Deposit Slip

MODELS:

- Matching old Program Requirements Against Resources Available
- Profit and Loss for each program (Income = Revenue - Expenses)

DATA BASE:

- \* Resources Master File
- \* Ticket Master File
- \* Program Master File
- \* Accounting File

TECHNOLOGY:

- \* Manual Systems in Ticket Office
- \* Personnel Computer in Accounting
- \* Personal Computer in Activities Office

OUTPUT:

- \* Ticket **Control** Report
- \* Program Schedule Report
- \* Reservation **Status** Report
- \* Seat Availability **Report**
- \* **Program** Profit and Loss
- \* Resources Inventory Listing

CONTROLS

- \* Preprinted Tickets
- \* Tickets Equal **Seats** .
- \* Backup on Floppies
- \* Seating Chart **Marked** as **seats** are sold

(1) INPUT

A. The activities officefills out a program input sheet when A program is **booked**. The data sheet contains the following **information**:

- \* A program ID number (accounting number)
- \* Name of the Program or performer
- \* Estimated cost of the program
- \* Date of the program
- \* Duration **of** the program
- \* Resource requirements **(i.e.** staging, lighting, seating)
- \* Selection of resources configuration layout

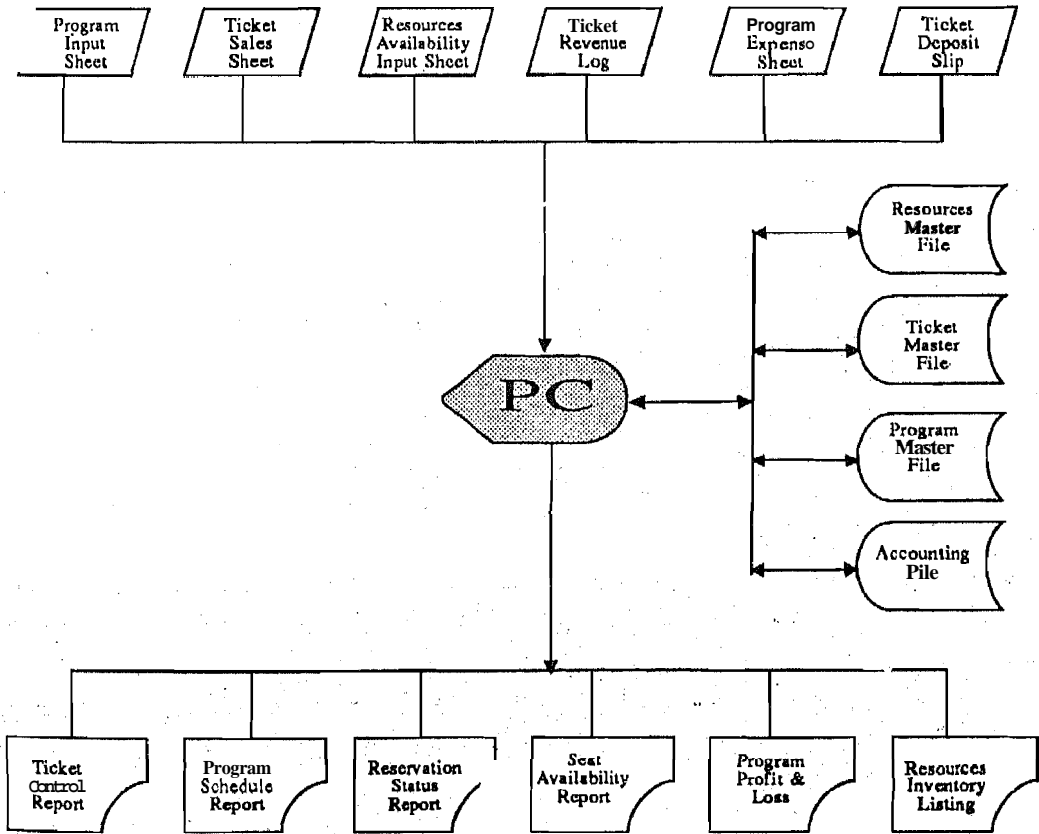
The data sheets are **batched** and entered into the activities office PC on a daily basis.

B. As preprinted tickets are sold, they are entered on a ticket sales **revenue** log sheet **by the** ticket office. The data sheets are sent to the activities **office** on a daily basis and entered in the PC.

Ticket deposit slips (bank **deposit** slip) and the ticket sales recap sheet **are** sent to the account- ing office on a daily basis. **The** accounting office batches and posts **these** data **sheets** as part of the normal accounting cycle. The data sheets contain the following **information**:

- \* Log sheet line number
- \* Name of the **patron** (If phone order)
- \* Number of reservation (ticket **numbers**)
- \* Program, Program **name**, performer name
- \* Date purchased
- \* Purchase price
- \* Amount deposited .

STAND ALONE BATCH ALTERNATIVE



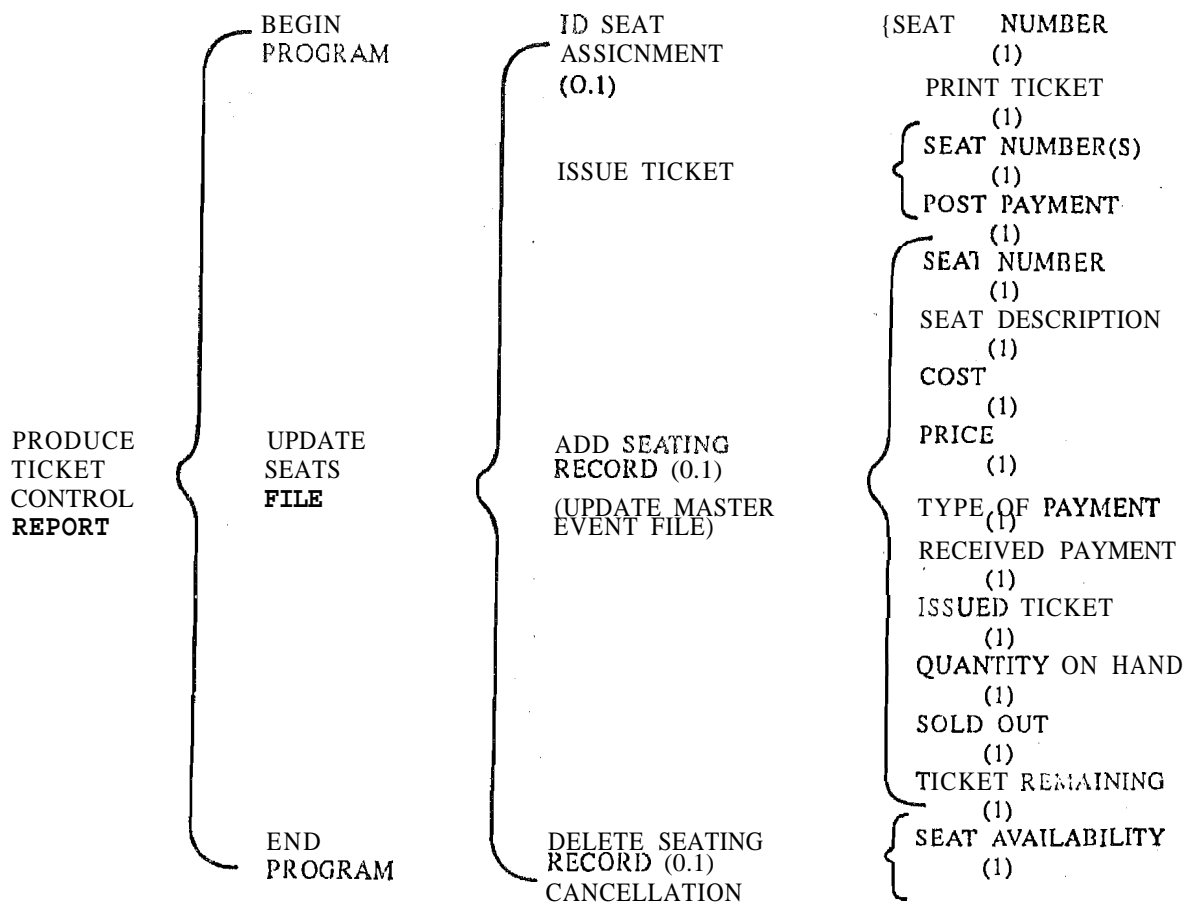
C. As resources become available or the availability changes, the facilities division fills out a resources available input sheet. This data sheet is sent to the activities office and entered on the PC. An expense sheet containing a code for each program and costs allocated to it is sent to accounting.

(2) MODELS

- A. The resources master file produces a report that identifies resources available for each program.
- B. Accounting models require the analysis of revenue and expense items per program to produce a profit and loss statement for each event on a weekly basis. An accounting general ledger code is used to identify the event and the type of revenue and expense item incurred.

(3) OUPUT

A. A ticket control report is produced to show tickets sold against seats for a program. Any variances or duplications are highlighted. This report is also used by accounting to verify cash deposited. Processing of the ticket control report is illustrated in the following Warner-Orr (W-O)



- B. A program schedule report is produced by listing the names of all programs, performers, cost of programs/performers, data of program and duration. The report can be printed and distributed weekly by the activities office or more often if needed. Online inquiry will only be available at the activities office.
- C. Reservation status report is produced analyzing the status of ticket sales in the ticket master file and the program master file. A separate report is produced for each program. Each report contains a list of reservations by ID/name, tickets inventory logged by number and tickets issued.



- D. A seating availability report is produced using the ticket master file. The report indicates the seats and tickets that are still available for each program.
- E. The program profit and loss statement is produced from the accounting files. The report contains ticket receipts to date and expenses incurred to date.
- F. A resources inventory listing is produced using the resources master file. This report contains a listing of available staging, lighting, seating and canteen facilities available in the gymnasium.

#### (4) TECHNOLOGY

- A. The ticket office works on a manual system. Tickets are preprinted and the results of daily sales are entered on data sheets. The data sheets are sent to the activities office for processing on their personal computer.
- B. The facilities division is supplied with input, change and delete forms that they submit to the activities office to maintain accuracy of the resources master file.
- C. The activities office processes the forms from the ticket office and the facilities department on their personal computer. Forms generated from their own division are also processed. The appropriate menu-driven software will be available to maintain the files and produce the reports. Batch processing of data sheet is also performed.
- D. The accounting department uses a personal computer to maintain the accounting file used to produce the program profit and loss statements.

#### (5) DATABASE

- A. The resources master file contains all the resources available in the gymnasium. The items are classified and coded by asset type such as staging, seating or canteen.
- B. The ticket master file contains the ticket inventory for each program, the price of each ticket, and the seat assigned if applicable.
- C. The program master file contains the name and ID of the program or performer, estimated cost of the program, date of the program, duration of the program, and resource requirements.
- D. The accounting file contains information on revenue and expenses incurred for each program.

#### (6) CONTROLS

- A. System controls are as follows:
  1. Batch processing control totals of ticket office activities.
  2. Preprinted tickets accounted for and under tight access control.
  3. Seating chart is marked as tickets are sold.
  4. Tickets sold equals the number of seats marked.
  5. Files are backed up on magnetic tape.
- B. Access control is achieved by issuing keys to rooms that have computers.

COMPANY: MCG  
SYSTEM : STS

## INPUT

- Online **Ticket Deposit** Slip
- Online Program Input
- Online Ticket Sales
- Online Resources Input
- Online **Program Expenses** Input

## OUTPUT

- Online Ticket Control Report
- Online Schedule Report
- Online Reservation Status **Report**
- Online Program Profit and Loss Report
- Online Seat Availability Report
- Online Resources Inventory Listing
- Online Ticket Sales Recap Report

## MODELS



(same as **alternative 1**)

## TECHNOLOGY

- Local **Area** Network Connecting Divisions
- Personal Computer in Accounting Division
- Personal Computer in Ticket Office
- Personal Computer in Facilities Division
- Real Time Processing of Program and **Ticketing**
- Batch Processing in Accounting

## DATA BASE

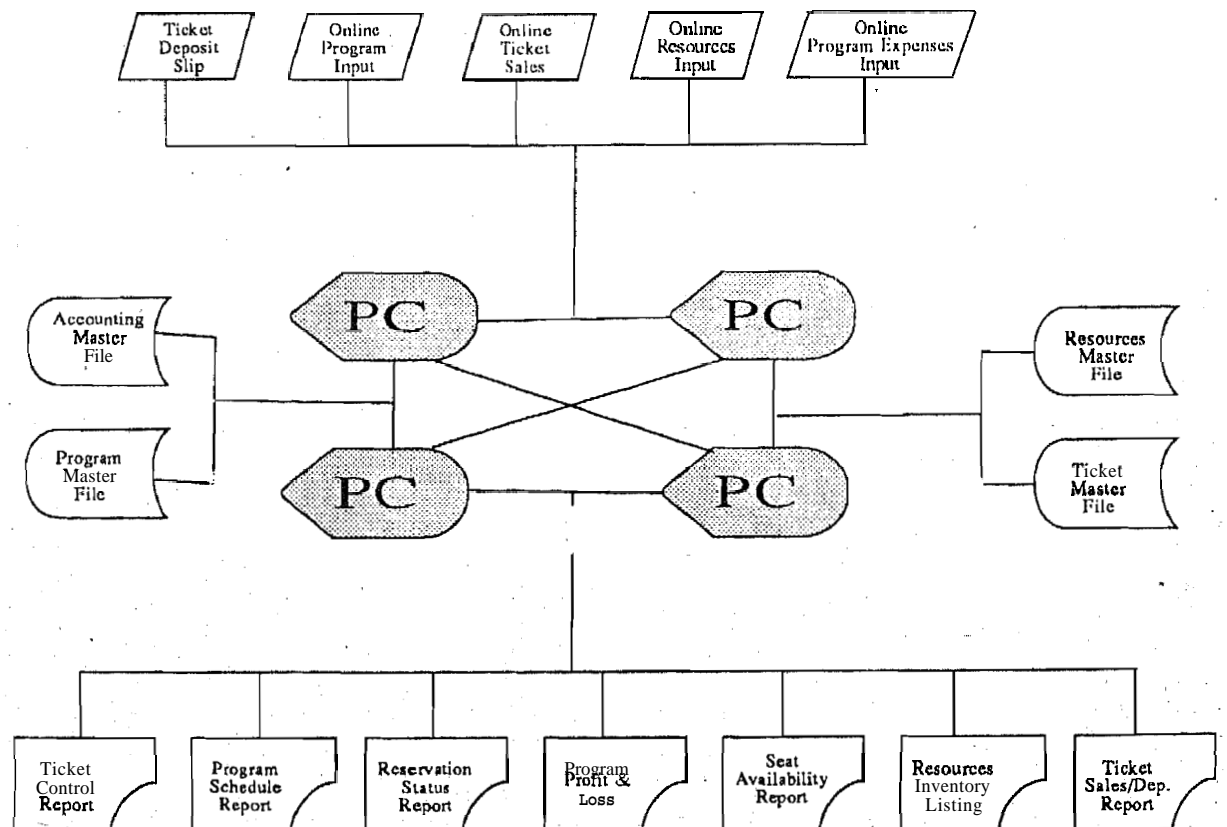


(same as **alternative 1**)

## CONTROLS

- Preprinted **Tickets**
- Central Backup on Magnetic Tape
- **Ticket** Equal Seats
- Seating Chart **Marked** as Tickets **as** Sold
- Passwords

## NETWORK BASED ALTERNATIVE



(1) INPUT

- A. The activities office inputs directly into their PC program data when a program is booked. The input screen contains the following information:
- |   |   |
|---|---|
| * A program ID number (accounting number) | * Duration of the program                                 |
| * Name of the program or performer        | * Resource requirements (i.e. staging, lighting, seating) |
| * Estimated cost of the program           | * Selection of resources                                  |
| * Date of the Program                     | * configuration layout                                    |
- B. As preprinted tickets are sold, they are entered directly into a PC in the ticket office. Ticket deposit slips and the ticket sales recap sheet are sent to the accounting office on a daily basis. The accounting office batches and posts these data sheets as part of the normal accounting cycle. The input screen contains the following information:
- |  |                                  |
|--|----------------------------------|
| * Log sheet line number                  | * Program name or performer name |
| * Name of the patron (if phone order)    | * Date purchased                 |
| * Number of reservation (ticket numbers) | * Purchase price                 |
|  | * Amount deposited               |
- C. As resources become available or the availability changes, the facilities division enters , add, change or delete information directly into its PC.

(2) MODELS

- A. The resources master file produces a report that identifies resources available for each program,
- B. Accounting models produce a profit and loss statement for each program on a weekly basis. An accounting general ledger code is used to identify the program and type of revenue or expense item incurred.
- (Note: The same data flow diagram presented earlier depicts this model).

(3) OUTPUT

- A. A ticket control report is produced to show tickets sold against seats. Any variances or duplications are highlighted. This report is also used by accounting to verify cash deposited.
- B. A program schedule report is produced by listing the names of all programs, Cost of programs/performers, date of the program and duration. Online inquiry or report output is available at all offices.
- C. A reservation status report is produced analysing the status of ticket sales in ticket master file and the program master file. A separate report is produced for each program. Each report contains a list of reservations by ID name, tickets inventory logged by number and tickets issued. Online enquiry or report output is available at all offices. (Note: the same W-O diagram presented earlier models this alternative).
- D. The program profit and loss statement is produced using the accounting file. The report is available only through the accounting office.
- E. A seat availability report is produced using the ticket master file. The report indicates the seats and tickets that are still available for each program. Online inquiry or report output is available at all offices.
- F. A resources inventory listing is produced from the resources master file. This report contains a listing of the available staging, lighting, seating, and canteen services available in the gymnasium. Online inquiry or report output is available at all offices.
- G. A ticket sales recap sheet and deposit slip is produced and used for accounting input and control.

(4) TECHNOLOGY

- A. The accounting division, the activities office, the ticket office and facilities division are linked together by a local network system. These divisions enter information directly into a personal computer in their division or office. The information is shared by the other divisions.
- B. The ticket office preprints tickets.
- C. Information from the activities office and the ticket office is provided in real time,
- D. Information produced in the accounting division is restricted for inquiry in the other divisions or offices. The accounting division processes transactions in batch processing made.

(5) DATA BASE

- A. The resources master file contains all resources available in the gymnasium. The items are classified and coded by asset type such as staging, seating or canteen.
- B. The ticket master file contains the ticket inventory for each program, price of each ticket, and seat assigned if applicable.
- C. The program master file contains name and ID of the program or performer, estimated cost of the program, date of the program, duration of the program, and resource requirements.
- D. The accounting master file contains information on revenue and expenses incurred for each program and other financial data.

(6) CONTROL

- A. System control are as follows :
  - 1. Printed tickets are accounted for and are under tight access control.
  - 2. Seating chart is marked as tickets are sold.
  - 3. Tickets sold equals the number of seats marked.
  - 4. Files are backed up on magnetic medium.
- B. Access control is achieved by passwords and issuing keys to the rooms containing computers.

III. CENTRALIZED ALTERNATIVE

Building Block Design Sheet

COMPANY : MCG  
System : SIS

INPUT



(same as alternative II)

MODELS



(same as alternative II)

OUTPUT

(same as alternative II)

TECHNOLOGY

- \* Multitasking, Multi-user Operating System
- \* Mini Computer Processing Unit
- \* CRT's for All Divisions and Offices
- \* Real-time Processing of Programs, Ticketing and Accounting
- \* Dial-in Access from Ticket Office in Central market

Prepared by: [Signature] Date: [Signature]

DATA BASE

(same as alternative II)

CONTROLS

- \* Automatic Ticket Printing
- \* Central Backup
- \* Passwords

(1) INPUT

(same as alternative II)

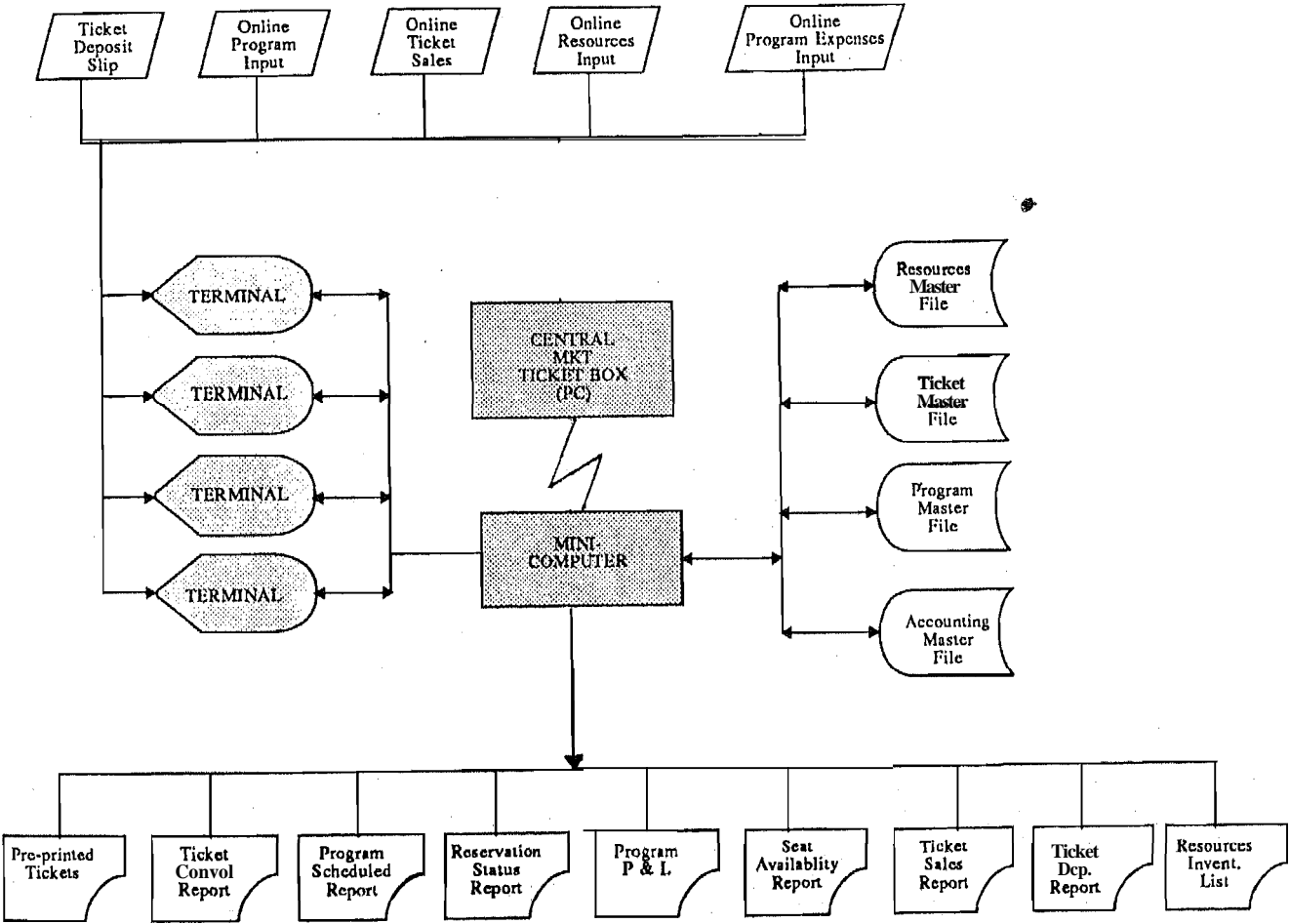
(2) MODELS

(same as alternative II)

(3) OUTPUT

(same as alternative II except for automatic printing of tickets)

THE CENTRALIZED ALTERNATIVE



(4) TECHNOLOGY

- A. All Division and offices enter data by online terminals.
- B. The system has its own ticket printing device.
- C. Information from the activities office and the ticket office is provided in real time.

D. ~~Information produced in the accounting division is restricted. The accounting division operates in a real time processing mode.~~

E. Access to the ticket **reservation system** is provided to the ticket office in **central** market of **the city**. This is **expected** to improve **access** of public to **program**.

(5) **DATA BASE**

(same as alternative II)

(6) **CONTROLS**

A. System **controls** are as follows:

1. Tickets are not **printed** until sold.
2. **Electronic** seating chart is marked as **tickets are** sold.
3. Tickets sold equals the number of seats marked.
4. Files **are** backed up on magnetic medium

B. Access control is achieved by issuing keys to the rooms containing **terminals** or the **com-**puter and by issuing passwords.

### MAHARAJA COLLEGE'S GYMNASIUM EVALUATION AND SELECTION OF SYSTEMS

#### CONDUCTING EVALUATION

Once the three generic systems design alternative were finalised, Sarita asked Anoop Sarin to schedule a meeting of the project team to review them. Because the final choice of a systems alternative would have a major impact on the function of the gymnasium, thus it was essential project team be involved in the review. Sarita also felt that by making a formal presentation, she and Anil would be forced to consolidate the work completed to date.

After Sarita presented the findings, the three suggested alternatives were discussed threadbare. The meeting was long and often heated. A gist of the discussions is presented as under.

The stand-alone batch alternative automates the current manual system. Sarita and Anil estimated that at best it would provide a 20 percent increase in efficiency. Although they felt this increase would adequately solve the problems in the gymnasium, they were concerned that this alternative revolved around manual handling of ticket delivery process for a given program. Most programs require using three to four ticket salespeople simultaneously and only one centralized preprinted batch of tickets for program. Either the ticket sales staff would be bumping into each other or they would have to break up the tickets into smaller batches and allow each sales person to sell for only one section of the gymnasium. They would also have to share one seating chart or face difficulties in not duplicating seats offered to customers. However, the computer system portion of this alternative seemed extremely inexpensive to implement and administer. Costs of maintaining portions of the current manual system were yet to be determined. The important questions according to Sarita was, "Is this the best alternative when total costs are compared to total benefits?"

The project team felt the network-based alternative provided a means for each department to share information. A 50 to 60 percent improvement in efficiency is anticipated. This coordination and efficiency improvement would allow the Gymnasium to operate at near capacity.

The centralized alternative, although most attractive to all concerned, but MCG budget had been traditionally low, the team felt that requesting the funding for such an elaborate system might not find support in Management Committee. As a systems professional, however, Sarita was morally bound to present the centralized alternative because benefits projected far exceeded the costs, thus resulting in a better benefits-to-cost ratio than the other two alternatives.

By the end of the meeting the committee concluded that they could not reach a decision on the generic systems design alternatives until vendor proposals were evaluated and facts concerning the specifics on each technology platform were gathered and a cost-effectiveness analysis was performed.

Before developing the request for proposal (RFP), Sarita felt that one enhancement should be made. For each ticket disbursement by a given sales agent, a summary statement should be printed that would serve as a receipt for the transaction. This statement would include the number of tickets, type of tickets, type of payment, amount of payment, and so forth, and would serve as input to the accounting system. Then, if the customer needed further service, a record of the prior service could be obtained.