CHAPTER FIVE



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5. CONCLUSIONS AND DISCUSSION

5.1 Summary and Conclusions

A brief summary of the results and the conclusions of the research are presented.

5.1.1 Current Situation at OPD and Wards

Out Patient Attendance

Descriptive methods were used in analyzing patient attendance and admission patterns. Annual increase was seen during the period 1995 to 2001 in both General Out Patient attendances as well as in out patient clinic attendance. In year 2001, 550,189 patients visited General OPD. Average monthly attendance and average daily attendance are 45,849 patients and 1,870 patients respectively. General OPD section mainly provides Medical, Surgical, Injections and Dressings facilities. Most of the OPD patients were Medical patients.

Admissions

Daily average admissions have increased over the years for most of the specialties. During the period 1995 to 2001 number of daily admissions have changed between 350 to 550 patients. Admissions were highest in Medical wards and relatively high in Surgical wards and Accident wards. Daily average sick varied between 2300 patients to 3100 patients and daily average floor patients varied between 0 to 300 patients

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Also a random pattern of attendance and admissions were seen within the year.

during that period. In year 2001, floor patients have much reduced.

Availability of Resources and Facilities

Out Patient Department

Available resources like staff capacity and equipment are inadequate and most of the staff agreed that the available waiting area for patients is inadequate. Majority of patients were averagely satisfied on hospital staff and available equipment. They were less satisfied on waiting area and infrastructure facilities and very much satisfied on

consultation days and consultation hours. Most of the staff and patients were with the view that the present priority criteria should be changed and it should be based on the condition of the patient.

Nurses lack changing room, common room or tearoom and clean and hot water. Doctors need more examination beds, washbasins, hot water and facilities like fans and A/C. Majority of patients stated that there should be a reception or inquiry counter and directions to patients should be displayed. Also they agreed that infrastructure facilities and waiting room facilities should be improved.

Wards

During those 7 years, admissions have increased by on average 2520, discharges have increased by 2509, but bed capacity has increased by only 183. Thus, increase in bed capacity is not proportional to the increase in admissions. Bed occupancy rate is high for most specialties (around 100%). Most of the wards (out of 23) have between 50%-75% of required resources like medical and nursing staff, equipment, space and funds. Facilities available for medical staff at wards are inadequate.

Difficulties faced by Staff and Patients

Because of the large number of patients at OPD, staff could give very less time per patient. Most of OPD doctors see between 60 to 80 patients in their six-hour shift and they could spend on average 5 minutes for the treatment as well as for a referral.

Some other difficulties are, lack of resources like staff, equipment and space and ignorance of patients regarding hospital procedures. Long waiting times and long queues are two common difficulties most patients faced. Inadequate facilities, difficulty in getting information they need and irregularities of hospital staff are some other difficulties.

Two common difficulties at wards are large number of patients and hence less time per patient. Between 25-40 patients were seen in a ward round in wards with 30 bed capacity and 50-60 patients were seen in wards that exceeds 50 beds. Most of the medical officers at wards agreed that they have too much of work. Lack of resources, ignorance of patients and minor staff, lack of patients' concern regarding diseases, stress and fatigue and inadequate facilities for staff are some other difficulties which affect them averagely.

5.1.2 Overcrowding and Waiting

Overcrowding and Waiting at OPD

OPD is an overcrowded place. There is no inquiry counter to make inquiries and no proper directions to patients regarding different rooms and units. Expected waiting time of the visit is between 3.5 hours to 4 hours and majority of patients were less satisfied with the current waiting time. Main reason for high waiting times and large queue lengths is the high demand at OPD. Thus this amount is not manageable for OPD staff. And they are unable to provide efficient service. Possible reasons for overcrowding at OPD were identified as, unnecessary arrivals, lack of resources like staff, space, equipment and ignorance of patients regarding hospital timings and procedures. As patients identified one main effect of waiting is loss of time. Lost of faith in health care facility and feeling of insufficient care from the staff also have considerable effect.

There are several counters at OPD namely, entry counter to issue numbers, Room 15 for Medical patients, Room 18 for Surgical patients, Room 3 for Injections, Room 5 for Dressings and Room 2 for staff personnel. The queueing system at General OPD was simulated using the simulation language GPSS/PC, General Purpose Simulation Software. Average waiting times and average queue lengths are high at some counters like Entry Counter in the morning, Room 15 in the morning, Room 5 and Room 2.

Suggestions to Reduce Overcrowding at OPD

1. Issue limited numbers per day.

OPD should issue limited patient numbers per day, which the OPD staff can manage and room wise issuing should also be done. That means a particular number of patient numbers, should be issued at different rooms. Using simulation numbers to be issued at different counters were suggested.

Simulation showed that employing two servers at entry counter in the morning would result in reducing waiting times and queue lengths. This will reduce average waiting time to 9 minutes and average queue length to 39 patients. To overcome overcrowding at Room 15, one suggestion is to issue only 150 numbers per one hour. By doing this, average waiting time per one hour will be 12 minutes and average queue length will be 33 patients. To reduce queueing at Room 5 the suggestion is to hold afternoon sessions till 3.00 p.m. for 2 or 3 days a week. At this room, 90 numbers can be issued in the morning and 60 numbers in the evening. At Room 2, by treating equal number of patients for morning and evening (around 125 patients per session) average queue length would be reduced to 13 patients and queue time would be reduced to 27 minutes. At Room 18, the session can be extended to 8.00 a.m. to 12.00 p.m.

2. Implement referral system and encourage referrals to nearby hospitals To reduce crowd at OPD of NHSL, a referral system should be implemented by networking all the government hospitals in Sri Lanka. Patients should have a referral letter from nearest hospital to them to access NHSL.

3. Develop rural health facilities

Even though they have a closer hospital than NHSL most of patients (66%) visited OPD of NHSL. Visits on referrals and closeness were around 56%. Others have visited because they thought it provides better service than other hospitals and they cannot afford private hospitals or dispensaries. So if the rural and local hospitals are developed to provide all main services then patients would move towards those rural hospitals. This will avoid unnecessary arrivals to OPD.

4. Changing the existing layout at OPD

As suggested in Figure 3.8 the unused space can be properly utilized by changing the existing OPD layout. This will reduce queueing at Room 15.

5. Some other suggestions are to create awareness among patients, provide more resources and implement better management and administration.

Overcrowding at Wards

Wards of National Hospital also have overcrowded. Between 5 to 20 floor patients can be seen in most of the wards. One leading reason for overcrowding is, admission of patients who can be treated at small hospitals or OPD. Some other reasons for overcrowding are, lack of urgency on part of the staff to treat patients, delay in treatments due to malfunctioning of equipment, Lack of beds, space and funds and improper utilization of available resources. Overcrowding causes increase in discomfort of patients and inefficiencies due to work overload.

Suggestions to Reduce Overcrowding at Wards

1. Avoid unnecessary admissions

Unnecessary percentage of admissions is between 60% - 80% for Medical and Orthopaedic wards, 10% - 40% for Surgical wards and 30% - 50% for Cardiology wards. Thus if these admissions were avoided, overcrowding could be much reduced

- 2. As far as possible pre-operative investigations and tests can be carried out at OPD level.
- 3. Encourage referrals if patients can be treated at other nearby hospitals/clinics
- 4. Preventive maintenance of equipment on a regular basis to prevent any breakdowns and delays in treatment leading to prolonged hospital stay.
- 5. Motivate and educate staff for prompt treatment and discharge of patients and ensure, no delay due to shortage of medicine

5.1.3 Suggestions to Improve Service Efficiency

- 1. Since available resources are inadequate, more resources like staff, equipment, space should be provided and also available resources should be properly used.
- 2. By job description, target settings, regular evaluation of staff and avoiding irregularities of staff, delay in work can be overcome and it leads to improve service efficiency.
- 3. Referrals should be encouraged to other nearby hospital whenever possible, then the amount at OPD will be reduced.
- 4. Awareness should be made among patients regarding hospital procedures, timings and about diseases also.
- Computerisation can be used at OPD as well as at wards. This can be used in patient administration, accounts handling and in Management Information Systems.

5.2 Discussion

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Participation to the Questionnaire Survey

Questionnaires were distributed among 33 OPD nurses, 48 OPD doctors, 30 doctors at wards and 50 OPD patients were interviewed. Of these questionnaires 27 OPD nurses, 28 OPD doctors and 23 ward doctors submitted questionnaires back. The response rate of OPD doctors is less.

Limitations of the Research

The simulation at OPD dispensary was not done, as it is not possible to observe arrival and service patterns because of the large number of patients. Also tea breaks and lunch breaks were not included in simulation as the memory capacity is limited in GPSS/PC. Questionnaire survey for admitted patients was not done and waiting line characteristics for these patients was not found as the permission form hospital authorities was not granted to access wards of NHSL.

Unavailable Information

Available staff capacity, bed capacity, daily admissions were not mentioned in most of the questionnaires filled by doctors at wards (Question 3-b in Questionnaire 4).

Generalisation for the Whole Hospital System

This research was done in NHSL and the procedures of other government hospitals were also similar to NHSL. Thus some of the results (reasons for overcrowding, suggestions to overcome overcrowding and improve service efficiency and effect of computerization) can be generalized to all the public hospitals in Sri Lanka.

5.3 Recommendations

Enforce Referral System

Patients should have a referral letter from nearest government hospital to access any other government hospital. Patients should first visit nearest hospital to them and if it's an emergency case emergency action should be taken. Otherwise hospital authorities should decide whether to refer him NHSL or any other close by hospital or to treat at their local hospital. If referral is needed a referral letter should be issued and an appointment date should be made for patient to visit NHSL or any other referring hospital. For example if a patient to be referred from a local hospital to the Room 15 at OPD of NHSL, authorities should contact NHSL and possible date and time should be reserved for that particular patient. Since the telephone communication system is functioning well in many districts of Sri Lanka, contacts can be made through telephones.

Avoid Delays

Delays occur because of the mistakes done by staff. For example when doctors write prescriptions without date and patient number the dispensary cannot issue medicine, as they have to keep all the records. In such cases patients were sent back to doctor to get it correct. Thus patients have to spend his time waiting for unnecessary things. Such delays should be avoided.

Proper Record Keeping and Computerizing the System

All the records; patient records, admission records, details of bed capacity, staff capacity, equipment and other resources and supplies, accounts records should be kept separately for different sections of National Hospital. Frequently analysis and review should be done in order to ensure all the services and supplies are functioning properly.

At present, computers are used in some of the sections at National Hospital. Those are Accounts Branch, Salary Branch, Pathological lab, Doctors' Lounge, Medical Record Room and some wards like Neurology and Accident Service. No computers are used in OPD and in personnel management, material management. It is recommended to use at least one computer for each section for record keeping and data management.

Use of Telemedicine

The technique of telemedicine should be implemented at least in major government hospitals. Thus small or rural hospitals can get assistance whenever need, from major hospitals easily.

5.4 Further Work

A detailed analysis of inpatient section can be done if permission would be granted to access wards of National Hospital. Also the research can be extended to study all the main government hospitals in Sri Lanka. Further comparative study can be done with hospitals of other countries.



5.5 Some Remarks

Larger hospitals are overcrowded while smaller institutions have underutilized. So these under utilized, small hospitals should be improved so that people in those areas can move on to closer hospitals instead of moving to overcrowded larger hospitals. In 1997 Presidential Task Force appointed by the President, identified some areas for immediate implementation. One suggestion is to improve one hospital in each district in a planned manner, to reduce inequities in the distribution of services and to provide high quality facilities to people living in remote areas. Under this 27 hospitals have been selected and development of 2 hospitals in Hambantota and Polonnaruwa has already been completed.

Another one is to expand the services to areas of special needs like elderly, disabled, victims of war and conflict, occupational health problems, mental health and estate health services. Fifty estate hospitals were identified to be taken over by the government in order to provide quality health care services in the estate sector. Twenty one have been taken over and their services have been improved. Action is being taken to strengthen and decentralize mental health and promote school health. Reforms of the organizational structure, to improve efficiency and effectiveness are also recommended. Resource mobilization and management, including alternative financial mechanisms, resources sharing between private and public sectors and rationalized human resources development are also among recommendations (Annual Health Bulletin 1999, Central Bank Annual Report 2001).

APPENDIX - I

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QUESTIONNAIRES

QUESTIONNAIRE 1

A Study to Assess Nurses' Views on Hospital Waiting Lines at OPD of NHSL

	Reference No.
Room / Clinic	(1 of office use only)
1. Age	
1. less than 30 years $2.31 - 40$ years	
3. $41 - 50$ years 4. $51 - 60$ years	
2. Is the present amount of patients manageable?	
1. Yes 2. No	
3. Is the present staff (Nurses) adequate to manage patient	nts?
1. Yes 2. No	
4. Are there enough equipments/resources to treat patien	ts?
1. Yes 2. No	
5. (a). Duration of a shift (in hours). A Dissertations	
(b). Do you have to work more hours for a shift?	
1. Yes 2. No	
If 1, go to part (c) otherwise go to question 7.	
(c). How many days do you have to work long shifts for a	week?
6. (a). Average number of working days per month	
(b). Do you have to work in holidays also?	
1. Yes 2. No	
If 1, go to part (c) otherwise go to question 8.	
(c). How many additional days do you have to work for	or a month?
7. Distance (approximately in km's) and time taken to tra	vel (approximately in
minutes) from home to work place? Distance	Time
9. What can you say about the waiting room for patients	?
1. Adequate 2. Inadequate	

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If 2, go to question 11 otherwise go to question 12. 11. If it should be changed how? 1. Based on sickness 2. Based on distance 3. Combination of these two and present criteria 4. Other (mention)	1.	Good 2. Should be changed
11. If it should be changed how? 1. Based on sickness 2. Based on distance 3. Combination of these two and present criteria 4. Other (mention) 5. Lack of resources - Staff & equipment Space Drugs and medicine 2. High amount of patients & less time per patient 3. Ignorance of patients 4. Lack of patients' concern regarding diseases 5. Ignorance of minor staff 6. Other 5. Ignorance of minor staff 6. Other 6. Other 7. Orbide more staff & equipments 7. Provide more staff & equipments 8. Job description, target setting and regular evaluation 4. Encourage referrals to other hospitals 5. Make awareness among patients 6. Avoid irregularities of staff 7. Other 14. Can service efficiency be improved by a computerized system? 1. Yes 2. No 3. Don't know	If 2, go to c	juestion 11 otherwise go to question 12.
1. Based on sickness 2. Based on distance 3. Combination of these two and present criteria 4. Other (mention) 5. Lack of resources - Staff & equipment 8. Provide more of patients 9. Lack of patients' concern regarding diseases 9. Ignorance of patients 9. Lack of patients' concern regarding diseases 9. Ignorance of minor staff 6. Other 6. Other 7. Decreated Disertation 13. What are your suggestions to improve service efficiency? 1. Provide more staff & equipments 2. Provide more buildings/space 3. Job description, target setting and regular evaluation 4. Encourage referrals to other hospitals 5. Make awareness among patients 6. Avoid irregularities of staff 7. Other 14. Can service efficiency be improved by a computerized system? 1. Yes 2. No 3. Don't know	11. If it sho	ould be changed how?
12. What are the difficulties you faced in handling patients? 1. Lack of resources - Staff & equipment Space Drugs and medicine 2. High amount of patients & less time per patient 3. Ignorance of patients 4. Lack of patients' concern regarding diseases 5. Ignorance of minor staff 6. Other 13. What are your suggestions to improve service efficiency? 1. Provide more staff & equipments 2. Provide more buildings/space 3. Job description, target setting and regular evaluation 4. Encourage referrals to other hospitals 5. Make awareness among patients 6. Avoid irregularities of staff 7. Other 14. Can service efficiency be improved by a computerized system? 1. Yes 2. No 3. Don't know	1. 2. 3. 4.	Based on sickness Based on distance Combination of these two and present criteria Other (mention)
12. What are the difficulties you faced in handling patients? 1. Lack of resources - Staff & equipment Space Drugs and medicine 2. High amount of patients & less time per patient 3. Ignorance of patients 4. Lack of patients' concern regarding diseases 5. Ignorance of minor staff 6. Other 13. What are your suggestions to improve service efficiency? 1. Provide more staff & equipments 2. Provide more buildings/space 3. Job description, target setting and regular evaluation 4. Encourage referrals to other hospitals 5. Make awareness among patients 6. Avoid irregularities of staff 7. Other 14. Can service efficiency be improved by a computerized system? 1. Yes 2. No 3. Don't know		•••••••••••••••••••••••••••••••••••••••
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 13. What are your suggestions to improve service efficiency? 1. Provide more staff & equipments Provide more buildings/space Job description, target setting and regular evaluation Encourage referrals to other hospitals Make awareness among patients Avoid irregularities of staff 14. Can service efficiency be improved by a computerized system? Yes No Don't know 	1. 2. 3. 4. 5. 6.	Lack of resources - Staff & equipment Space Drugs and medicine High amount of patients & less time per patient Ignorance of patients Lack of patients' concern regarding diseases Ignorance of minor staff Other
 13. What are your suggestions to improve service efficiency? 1. Provide more staff & equipments 2. Provide more buildings/space 3. Job description, target setting and regular evaluation 4. Encourage referrals to other hospitals 5. Make awareness among patients 6. Avoid irregularities of staff 7. Other 14. Can service efficiency be improved by a computerized system? 1. Yes 2. No 3. Don't know 		Electronic Theses & Dissertations
 Provide more staff & equipments Provide more buildings/space Job description, target setting and regular evaluation Encourage referrals to other hospitals Make awareness among patients Avoid irregularities of staff Other 14. Can service efficiency be improved by a computerized system? 1. Yes 2. No 3. Don't know	13. What a	e your suggestions to improve service efficiency?
 14. Can service efficiency be improved by a computerized system? 1. Yes 2. No 3. Don't know 	1. 2. 3. 4. 5. 6. 7.	Provide more staff & equipments Provide more buildings/space Job description, target setting and regular evaluation Encourage referrals to other hospitals Make awareness among patients Avoid irregularities of staff Other
1. Yes 2. No 3. Don't know	14. Can ser	vice efficiency be improved by a computerized system?
		1. Yes 2. No 3. Don't know
	15. (a). Ho	w long have you been working in this hospital?
(a). How long have you been working in this hospital?(b) How one patient are shown at the fact with 12	(b). Ha	Ve you noticed any changes during that period?
 (a). How long have you been working in this hospital? (b). Have you noticed any changes during that period? 		

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	(c). What type of changes you observed in the system?
	 Increase of patients Increase of staff Increase of resources Improvement of service efficiency Other (mention)
16.	What are the possible reasons for overcrowding at OPD
	 Unnecessary arrivals Ignorance of patients A. Irregularities of staff Other (mention).
17.	 As you think what can be done to reduce this large crowd? 1. Avoid unnecessary arrivals 2. Health education & make aware of patients regarding hospital timings, procedures 3. Encourage referrals to nearby hospitals 4. Develop rural health facilities 5. Provide modern equipment & proper maintenance of equipment 6. Provide more resources - staff, space, equipment 7. Avoid administrative weaknesses and ensure proper management 8. Avoid irregularities of staff 9. Other (mention)
18.	What facilities should be improved to provide better service
	1. Changing room 2. Common room 3. Clean water 4. Hot water

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QUESTIONNAIRE 2

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A Study to Assess Doctors' Views on Hospital Waiting Lines at OPD of NHSL

	Reference No.
	(For office use only)
1. Room / Clinic	
2. How many patients do you treat per day?	
3. Is this amount manageable?	
1. Yes . 2. No	
4. What is the average time taken (approximately in r	ninutes) to treat a
patient?	
5. Is the present staff (doctors) adequate to manage pa	atients?
1. Yes 2. No	
6. Are there enough equipments/resources to treat pat	ients?
1. Yes 2. No	
7. What can you say about the waiting room for patie	nts?
1. Adequate	
8. What is your view on present priority criteria?	
1. Good . 2. Should be ch	anged
If 2, go to question 9 otherwise go to question 10.	
9. If it should be changed how?	
5. Based on sickness	
6. Based on distance	
7. 1,2 and considering present criteria	
8. Other (mention)	
10. (a). Duration of a shift (in hours)	
(b). Do you have to work more hours for a shift?	
1. Yes . 2. No .	
If 1, go to part (c) otherwise go to question 11.	
(c). How many days do you have to work long shi	fts for a week?

11. What are the difficulties y	you faced in handling patients?
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1. Lack of resources - Staff & equipment
Space
Drugs and medicine
2. High amount of patients & less time per patient
3. Ignorance of patients
4. Lack of patients' concern regarding diseases
5. Ignorance of minor staff
6. Other
12. What are your suggestions to improve service efficiency?
1 Provide more staff & equipments
2. Provide more buildings/space
3. Job description, target setting and regular evaluation
4. Encourage referrals to other hospitals
5. Make awareness among patients
6. Avoid irregularities of staff
7. Other
13. Can service efficiency be improved by a computerized system?
1. Yes 2. No 3. Don't know
14. The number of years you worked in this hospital
15. Have you noticed any changes during that period?
1. Yes . 2. No .
If 1, go to question 17 otherwise to question 18.
16. What type of changes you observed in the system?
1 Increase of natients
2. Increase of staff
3. Increase of resources
4. Improvement of service efficiency
5. Other (mention)
17. What are the possible reasons for overcrowding at OPD
1. Unnecessary arrivals 2. Lack of resources
3. Ignorance of patients 4. Irregularities of staff
5. Other (mention)

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18.	As you think what can be done to reduce this large crowd?
	1. Avoid unnecessary arrivals

2.	Health education	& make a	aware o	of patients	regarding	hospital	timings,	
	procedures							

- 3. Encourage referrals to nearby hospitals
- 4. Develop rural health facilities
- 5. Provide modern equipment & proper maintenance of equipment
- 6. Provide more resources staff, space, equipment
- 7. Avoid administrative weaknesses and ensure proper management
- 8. Avoid irregularities of staff
- 9. Other (mention)
 -

19. What facilities should be improved to provide better service

- 1. More examination beds 2. Wash basins
- 3. Hot water
 4. Fans/AC

 5. Other (mention)

.....

20. What is your view on "telemedicine"?

(Telemedicine is the use of advanced information technology in medical field. Using high-speed data lines linked to video units at one main hospital, physicians and patients of another hospital can have a live interactive consultation with the specialists of main hospital by simply dialing up the person on video.)

1	Carl	
1.	Good	
2.	Good but difficult to implement in our hospitals	
3.	Government should take responsibility in developing this	
	technique at least in main hospitals	
4.	Haven't heard of it	
-		

5. Other (mention)

QUESTIONNAIRE 3

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A Study to Assess Patients' Views on Hospital Waiting Lines at OPD of NHSL

	Date// Time Case Number (For office use only)
1.	Room / Clinic
2.	Patient Number
3.	Age 1. $< = 20$ years 2. 21 - 40 years
	3. 41 - 60 years $4. > 60$ years \Box
4.	Sex
	1. Male 2. Female
5.	(a). District
	(b). Do you have a closer hospital than NHSL? 1. Yes 2. No
6.	Why do you visit this hospital?
	1. The closest hospital 2. Better service
	3. Referred by another doctor 4. No specific reason
	5. Cannot afford private medicin
7.	(a). Are you a first visit patient?
	1. Yes 2. No
	If 2, go to part (b) otherwise go to (c)
	(b). Basis for visit 1. Monthly 2. Weekly
	(c). What was the waiting time (approximately) of previous visit?
8.	(a). At what time did you arrive here today?
	(b). As you think at what time you would be able to leave today?
	(c). Are you satisfied with the waiting time?
	1. Very much 2. Average 3. Less 4. No
9.	(a). What is view on present priority criteria?
	1. Good 2. Should be changed 3. No idea
	(b). If not what type of priority criteria is preferable?
	9. Based on sickness . 2. Based on distance
	3. 1, 2 and present criteria 4. Other (mention)

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10.	Are	you	satisfied	with	available	facilities/	procedures?
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		Very much	Average	Less	No
1.	Staff				
2.	Waiting room facilities				
3.	Infrastructure facilities				
	(water, sanitary, canteens)				
4.	Equipment				
5.	Consultation days				
6.	Consultation hours				
11. What fa	acilities should be improved a	at OPD of NH	ISL?		
1.	Inquiry/reception counter				
2.	Proper direction to patients				
3.	Infrastructure facilities				
4.	More seats at waiting are				
5.	More space at OPD				
6.	More staff				
12. Are you	u satisfied with the overall ser	vice provided	l by OPD se	ection?	
1.	Very much 2. Av	erage	3. Less] 4.	No
13. What d	ifficulties you faced during th	is visit?			
1.	Long waiting times	2.	Long queu	es	
3.	Rudeness of staff	4.	Less time p	oer patien	it 🗌
5.	Inadequate facilities	6.	Difficulty i	n getting	
7.	Irregularities of staff		information	n	
14. As you	think what are the effects of v	waiting on pat	tients?		
1.	Loss of time				
2.	Increased suffereing				
3.	Deterioration of the condition	on 🗌			
4.	Loss of faith in health care f	acility			
5.	Feeling of insufficient care	from the staff			
15. What a	re your suggestions to reduce	waiting time/	overcrowdi	ing	
1.	Develop rural hospitals				
2.	Better management and admi	nistration			
3.	Increase staff	[
4.	Increase resources/equipment	. [

QUESTIONNAIRE 4

A Study to Assess Doctors' V	Views on Hospital Service at
Wards o	of NHSL

Case No.	
(For office use	only)

Instructions to fill the questionnaire:

- Please read the questionnaire carefully and fill it properly.
- In most of the questions, you have to tick appropriate box/boxes by a \checkmark mark.
- In very few questions, you have to write the answer in the space provided.
- 8. (a). Unit
 - (b). Ward Number.....
- 9. (a). Designation.....
 - (b). Sex
 1. Male
 2. Female

 (c). Age
 1. Less than 30
 2. Between 31 40

 3. Between 41 50
 4. Between 51 60
- 10. (a). Admission criteria
 - 1. Referral is needed 2. No referral 3. Both are allowed
 - (b). Please provide following statistics also (write the answer in the box).

Number of daily	admissions (approximately)	
Staff capacity	Medical Staff	
(Please give the	Para-medical staff - Nurses	
Number)	Other	
	Minor Staff	
Bed	capacity	

- 11. (a). What is the average number of patients seen on a ward round?
 - (b). Is it possible to see all patients in the ward everyday?

1. Yes ____ 2. No ____

- 12. (a). How many days do you have to work for a month (on average)?....
 - (b). If you have to work in additional days how many days do you have to work additionally for a month (on average)?.....
- 6. (a). What is the duration of a shift (in hours).....
 - (b). Do you have to work more hours for a shift?
 - 1. Yes 2. No
 - (c). If so, how many additional hours do you have to work for a week?.....

7. (a). Are there any floor patients?

1. Yes 2. No (b).

Number of floor patients per day.....

8. What can you say about the availability of resources? Please give the existing amount as a percentage of required amount (approximately).

Resources100%75%50%25%Staff - Medical
Para medical -Nurses
OtherMinor StaffBedsEquipmentDrugs & MedicineSpaceFunds

9. What can you say about the existing service level of staff?

Staff	Very efficient	Efficient	Average	Less efficient	Inefficient
Medical					
Para medical-Nurses Other	University of Mora Electronic Theses &	tuwa, Sri Lar Dissertation	ka. Is		
Minor staff	www.lib.mrt.ac.lk				

10. Do you think that the standard of care is rising or falling?

1.	Rising	2.	Falling	
3.	Static [4.	Don't know	

11. Do you think that there is too much of work?

1. Too much

2. Not too much

3. Don't know

12. (a). What can you say about the length of stays (in days) of the ward?

Average Length of stay	
Average pre-operative Stay (if relevant)	
Average post-operative Stay (if relevant)	

(b). Is there any way of reducing pre-operative stays and post-operative stays?

.....

13. What can you say about the available facilities for staff?

······

14. (a). What are the possible reasons for overcrowding at wards?

Reason	Very	Average	Slightly	No
Admission of patients who can be treated at OPD's	muen	Average	Singhtiy	140
Admission of patients who can be treated at small hospitals				
Lack of urgency on part of the staff to treat patients				
Delay in treatments due to malfunctioning of equipment				
Delay in discharging patients after treatment				
Unscheduled leave/absence of doctors and other staff				
Lack of resources - Medical staff				ļ
Para-medical staff				
Beds				
Equipment				
Drugs & Medicine Space These & Dissertations				
Funds ^{10, mrt, ac 1k}	<u> </u>	<u> </u>		
Improper utilization of available resources		ļ		
Other (specify)				

(b). What is the percentage of admissions which can be treated at another

nearby hospitals/clinics (approximately)?

(Mention the percentage as a percentage of total admissions).

15. What are the possible effects of overcrowding?

Effect	Very much	Average	Slightly	No
Unnecessary blockage of resources like beds				
Inefficiencies due to work overload				
Quality of medical attention suffers				
Increase in discomfort of patients				
Stress and fatigue				
Limited time per patient				
Other(specify)				

Difficulty	Very much	Average	Slightly	No
Lack of resources - Medical Staff				
Para-medical staff				
Space				
Equipment				
Drugs and medicine				
High amount of patients				
Ignorance of patients				
Lack of patients' concern regarding diseases				
Ignorance of minor staff				
Less time per patient				
Stress and fatigue due to heavy work load				
Inadequate facilities for staff				
Other(specify)				

16. What are the difficulties you faced in treating and handling patients?

17. (a). How long have you been working in this hospital? Years.....Months.....

(b). What changes did you observe in this system during your service time?

Change observed	Very much	Average	Slightly	No
Increase of patients				
Increase of staff	Lanka. htions			
Increase of resources with mile ik				
Improvement in service Efficiency				
Improvement in hospital management & administration				
No change				
Other (specify)				1

Other (specify)				<u>_</u>
As you think what can be done to overco	me overcro	wding at	wards?	
Suggestion	Verv much	Average	Slightly	No
Avoid unnecessary admissions		8		
Preventive maintenance of equipment on a regular basis				
Motivate and educate staff for prompt treatment and discharge of patients			,	
Ensure, no delay due to shortage of medicine				
Carry out pre-operative investigations ant tests at OPD if possible				
Ensure, doctors/personnel are regular				
Encourage referals if patients can be treated at other nearby hospitals/clinics				
Other (specify)				

Appendix I - Page 12

Suggestion	Very much	Average	Slightly	No
Provide more resources - Medical staff				
Para-medical staff				
Beds				
Equipment				
Drugs & Medicine				
Space				
Funds				
Proper use of available resources				
Better management and administration				
Job description, target settings, regular evaluation of staff and avoid irregularities of staff				
Provide adequate facilities for staff				
Create awareness among patients				
Other(specify)				

19. What are your suggestions to improve service efficiency?

20. Can computerization be used in some tasks to improve service efficiency?

Task	Very much	Average	Slightly	No
Patient Administration crists of Moratur	wa, Sri Lanka.			
Materials management	Assertations			
Accounts				
Personnel management				
Management Information Systems				
Other(specify)				
For nothing				

21. What is your view on "telemedicine"?

(Telemedicine is the use of advanced information technology in medical field. Using high-speed data lines linked to video units at one main hospital, physicians and patients of another hospital can have a live interactive consultation with the specialists of main hospital by simply dialing up the person on video.)

Good	
Good but difficult to implement in our hospitals	
Government should take responsibility in developing	[
this technique at least in main hospitals	
Not necessary	1
Haven't heard of it	
Other(specify)	

22. Do you have any experience in hospitals at other countries?

1. Worked	2. Studied/trained	3. Just visited	4. Nothing
-----------	--------------------	-----------------	------------

If 1,2 or 3 go to questions 23 - 26.

For questions 23,24 & 25 please write the name of the country in doted lines.

23. Please mention the country/countries and unit/units you worked/trained/visited

and mention the type of the hospital. (Write the name of the hospital in dotted

lines and put the correct letter for type, S - State hospital, P - Private hospital)

	Country 1 Type	Country 2 Type
	Name	Name
Unit 1		
Unit 2		
Unit 3		

24. What are the observations you observed at different countries? (Put the appropriate letter in relevant box/boxes, V-Very much, A-Average,

S-Slightly, Y-Yes and N-No).

Country

1......2......

Overcrowding at wards	
Proper management of resources	
Standard of care	
Availability of modern equipment and adequate	
resources including staff, bed capacity and other	_
Free medical services provided by government	
Irregularities of staff	
Adequate facilities for staff	
Other(specify)	

25. Please provide following statistics (if possible).Country(Write the answer in the relevant box)1......2.......

Average Length of stay - No. of days	
Average pre-operative Stay - days (if relevant)	
Average post-operative Stay - days (if relevant)	
Number of floor patients per day (approximately)	
Number of admissions per day (approximately)	

26. Any other comment you wish to provide?

APPENDIX - II

.

Year	Section	January		February		March		April		Мау		June	
		Total	Daily	Total	Daily	Total	Daily	Total	Daily	Total	Daily	Total	Daily
			average		average		average		average		average		average
1995	Out Patient (General)	48190		41771		47569		41064		38556		38556	1313
	Out Patient (Accident service)											0	278
	Clinic patients	75170		78276		84246		70463		67106		67106	2817
	Total	123360	3980	120047	4287	131815	4252	111527	3718	105662	3408	109070	4408
1996	Out Patient (General)	37111	1197	32923	1135	38809	1252	27981	933	28050	905	40833	1361
	Out Patient (Accident service)	8317	268	7 018	Un242	ty of \8153	wa, Sri 1263	7580	253	8005	258	8542	285
	Clinic patients	80429	2594	81043	2795	79034	Disse 2549	68426	2281	68954	2224	77789	2593
	Total	125857	4059	120 984	4172	125996	4064	103987	_ 3467	105009	3387	127164	4239
1997	Out Patient (General)	39547	1276	36752	1312	37900	1223	30596	1021	44095	1422	43302	1443
	Out Patient (Accident service)	7334	269	7580	271	8351	269	8220	277	8696	281	8615	287
	Clinic patients	73738	2379	68826	3458	72996	2355	73630	2454	80224	2588	81958	2732
	Total	120619	3924	113158	5041	119247	3847	112446	3752	133015	4291	133875	4462
1999	Out Patient (General)	42641	1376	43438	1587	44435	1433	35952	1198	46494	1500	23372	779
	Out Patient (Accident service)	8625	278	8395	300	9332	301	7906	264	9041	292	8112	262
	Clinic patients	79628	2567	78195	2793	79228	2556	75073	2503	82044	2647	53630	1788
	Total	130894	4221	130028	4680	132995	4290	118931	3965	137579	4439	85114	2829
2000	Out Patient (General)	41378	1430	42808	1626	52740	1701	35591	1186	48680	1592	46231	1541
	Out Patient (Accident service)	8889	287	9176	302	9343	301	8375	280	9597	320	8073	269
	Clinic patients	88732	3060	91792	2977	95199	3071	78169	2606	91831	3061	96156	3205
	Total	138999	4777	143776	4905	157282	5073	122135	4072	150108	4973	150460	5015
2001	Out Patient (General)	47533	1533	42599	1521	49796	1606	42292	1410	48801	1574	48407	1614
	Out Patient (Accident service)	8782	283	8194	293	9275	299	8316	277	9191	296	8961	299
	Clinic patients	96009	3097	82547	2948	91721	2959	84601	2819	94311	3042	92182	3073
	Total	152324	4913	133340	4762	150792	4864	135209	4506	152303	4912	149550	4986

Table A2.1 Out Patient Attendance From Year 1995 to Year 2001

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Out Patient Attendance

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	0 //											Decembe	
Year	Section	July		August	T	September		October		November	·	r	·
		Total	Daily	Total	Daily	Total	Daily	Total	Daily	Total	Daily	Total	Daily
		ļ	average	 _	average	 	average	ļ	average		average		average
1995	Out Patient (General)	39869	1424	41293	2424	43717	1302	35923	1159	37002	1233	34675	1118
1	Out Patient (Accident service)	278	273	551	273	824	279	7988	258	8207	274	7778	250
	Clinic patients	69923	2728	72651	2745	75396	2783	81925	2643	83803	2793	78963	2547
	Total	113478		117903	5442	123345	4364	125836	4060	129012	4300	121416	3915
1996	Out Patient (General)	44735	1443	42782	1380	44562	1485	48182	1554	40641	1355	35277	1138
	Out Patient (Accident service)	8807	284	8624	278	8085	270	8614	278	8009	267	7827	252
ļ	Clinic patients	83224	2685	84897	2739	83349	2778	81011	2613	75459	2515	68665	2215
	Total	136766	4412	136303	4397	135996	4533	137807	4445	124109	4137	111769	3605
1997	Out Patient (General)	45344	1463	46550	1502		1483	45911	1481	48481	1616	43717	1410
	Out Patient (Accident service)	8610	278	8816	284	7928	264	8490	274	7991	263	8320	268
	Clinic patients	86294	2784	82071	2647	82600	2753	84995	2741	157340	5075	88367	2851
	Totai	140248	4525	137437	4433	135010	4500	139396	4496	213812	6954	140404	4529
1999	Out Patient (General)	41296	1333	48946	1586	52483	1749	43211	1394	45519	1517	45519	1517
	Out Patient (Accident service)	9322	301	9063	292	8931	298	8561	276	7838	253	7838	261
	Clinic patients	89142	2972	89321	2881	88448	2948	91428	2949	87373	2912	70829	2360
	Total	139760	4606	147330	4759	149862	4995	143200	4619	140730	4682	124186	4138
2000	Out Patient (General)	45305	1461	46264	1491	41721	1391	40708	1313	48090	1603	39339	1269
	Out Patient (Accident service)	9091	293	8731	282	8372	279	8826	285	8981	299	8303	268
	Clinic patients	90097	2906	86686	2796	96861	3229	94856	3060	102073	3402	93279	3009
	Total	144493	4660	141681	4569	146954	4899	144390	4658	159144	5304	140921	4546
2001	Out Patient (General)	50249	1621	45891	1480	43881	1463	48251	1556	43650	1455	38839	1253
	Out Patient (Accident service)	8987	268	8861	286	8492	283	8790	284	8047	268	8452	273
	Clinic patients	91011	2936	87564	2825	90629	3021	89471	2886	84421	2814	79771	2573
	Total	150247	4825	142316	<u>459</u>	143002	4767	146512	4726	136118	4537	127062	4099

Table A2.1 (contd.)

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Out Patient Attendance

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Year	Section	-	January			February		<u>`</u>	March			April			May			June	
		days	Patients	Daily	days	Patients	Daily	days	Patients	Daily	days	Patients	Daily	davs	Patients	Daily	davs	Patients	Daily
		treated	treated	Average	treated	treated	Average	treated	treated	Average	treated	treated	Average	treated	treated	Average	treated	treated	Average
1995	Medical	31	30584	987	28	25160	898	31	28815	930	30	25394	846	31	22586	729	30	31181	1039
	Surgical	31	1115	36	28	1058	38	25	1217	48	30	969	32	23	794	34	25	113	45
	Injections	31	2350	76	28	1795	64	31	2500	81	30	2190	73	31	2330	75	30	1697	57
	Dressings	26	4425	170	25	4193	167	27	4582	170	24	3711	155	26	4236	163	26	4762	183
ł	A.T.Injections	26	700	27	28	864	31	25	878	35	30	542	18	31	410	13	30	628	21
			July			August			Septemb	er		October	<u> </u>		Novembe	<u>r</u>		Decembe	r
	Medical	31	29900	967	31	33783	1090	30	30350	1012	31	27672	893	30	28115	971	31	27150	875
	Surgical	25	1282	51	26	1328	51	24	1174	49	23	1116	48	25	1117	45	24	1124	45
[Injections	31	1975	64	31	3300	106	30	2310	77	31	2750	89	30	2116	71	31	2061	66
	Dressings	26	4399	1/0	27	4815	178	25	4651	186	24	3923	164	26	4152	160	26	3814	146
1000	A. I. Injections	31	882	28	31	906	29	30	568	19	31	462	1 15	25	502	20	31	526	17
1990	Section	21	January	004		repruary	000	- 05	March		- 10	April	1000		May			June	
	Surgical	ວ ເ ວຣ	20010	904	29	23210	800	25	29509	01 M01180	a, Sn19	20259	1066	15	20987	1399	30	31533	1061
	Inipotiono	20	1020		23	2254	49	25	1214	Theses 49	18	ons 857	48	16	867	54	24	1371	57
	Droccingo	27	2200	10	29	3204	110	31	4404	4.00	30	2209	/4	31	2201	/4	30	2422	81
	A T Injections	21	4072	27	20	4097	104	20	4184	100	20	4026	155	25	3375	135	25	4/1/	189
	Section		042		29	1234	43	31	Sontomb	21	30		21		020	20	30	790	26
	Medical	31	34314	1107	26	33406	1285	30	35009	1167	26	27010	1422	26	22070	1222	24	Decembe	1002
	Surgical	24	1447	60	26	1511	58	24	1364	57	20	1813	70	20	1679	1233	24	20901	1003
	Injections	31	2837	92	31	2343	76	30	2342	78	20	3664	118	30	2447	82	20	2025	02
	Dressings	27	5347	198	27	4824	179	30	5250	175	26	4843	186	26	3584	138	26	2900	90 150
	A.T.Injections	31	790	25	31	698	23	30	598	20	26	852	33	30	862	20	20	804	26
1997	Section		January			February			March			April	100	0	Mav			June	20
	Medical	25	30550	1222	22	28554	1298	24	29336	1222	24	23445	977	23	35575	1547	24	34294	1429
	Surgical	25	1800	72	22	1649	75	25	1499	60	24	1350	56	23	1738	76	24	1996	83
	Injections	30	2220	74	28	2057	73	31	2392	77	30	1994	66	31	2231	75	30	1938	65
	Dressings	27	4185	155	23	3952	172	26	3637	140	22	2933	133	24	3691	154	25	4308	172
	A.T.Injections	30	780	26	21	540	26	21	1036	49	30	904	30	31	840	27	24	766	32
	Section	_	July			August			Septembe	er		October			Novembe	r		Decembe	r
	Medical	24	35404	1475	25	37167	1487	25	35079	1403	25	35996	1440	24	35744	1489	25	35605	1424
	Surgical	25	2514	101	25	1988	80	25	2012	80	25	1990	80	24	2717	113	25	1290	52
	Injections	31	2176	70	31	2090	67	30	2303	77	31	2308	74	30	2289	76	31	2307	74
	Dressings	27	4636	172	26	4573	176	26	4564	176	25	5011	200	25	4361	181	27	4515	167
	A.T.Injections	31	1228	40	31	732	24	30	524	17	31	606	20						

Table A2.2 Out Patients Attendance - Specialty wise - From Year 1995 to Year 2001

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Out Patient Attendance

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1999	Section	J	anuary		F	ebruary		M	arch		1	April		N	lay			June	
	Medical	23	34093	1482	23	33534	1458	23	35968	1564	22	27351	1243	24	31790	1325	12	16643	1387
ļ	Surgical	25	1739	70	23	3116	111	23	1935	84	22	2039	92	24	2109	98	12	1052	88
	Injections	31	2548	82	28	2229	80	31	2269	73	30	2485	83	31	2219	90	30	1426	48
	Dressings	26	4261	164	24	4559	190	25	4263	171	26	4077	157	25	3717	149	25	4221	169
ĺ	Section	J	uly		A	ugust		S	eptembe	r	(October		N	lovember			December	
	Medical	26	31790	1223	25	40004	1600	25	43041	1722	26	31094	1196	25	33094	1324	19	16585	· 873
	Surgical	26	2347	90	25	2323	95	25	2648	106	26	2830	109	25	2830	109	19	2900	153
	Injections	31	2785	90	31	2380	77	30	2459	82	31	2285	74	30	1595	53	31	2184	70
L	Dressings	27	4386	162	26	4289	165	26	4335	167	26	4172	160	26	4202	162	24	3232	135
2000	Section	Ji	anuary		F	ebruary		M	arch			April		Ň	lay			June	
1	Medical	24	32980	1374	23	35335	1536	25	43635	1745	21	29188	1390	25	38147	1231	24	38147	1589
	Surgical	24	1946	81	23	2195	95	25	2186	87	21	818	39	25	3206	103	24	1731	72
	Injections	31	2477	80	29	2179	75	31	2534	82	30	1843	61	31	2970	96	30	2448	82
	Dressings	25	3975	159	29	3931	136	31	4385	rsity of 41	25	a, Sr3742	150	25	4367	141	24	3905	163
ļ	Section	J	uly		A	ugust		S	eptembe	onic These	s & I	October		1	lovember		Ĩ	December	
1	Medical	24	37340	1398	26	38010	1462	24	33549	1398	k 24	31791	1325	25	38551	1542	24	30716	1280
	Surgical	24	2120	88	26	2384	92	24	2113	88	- 24	3019	126	25	3501	140	24	2995	125
	Injections	30	2212	74	31	2190	71	30	2210	74	31	2143	69	30	2001	67	31	2205	71
	Dressings	26	3633	148	26	3640	140	26	3849	148	26	3755	144	26	4037	155	26	3423	132
2001	Section	J	anuary		F	ebruary		M	arch			April		٨	/lay			June	
	Medical	26	38280	1472	22	34196	1554	25	39855	1594	22	33194	1509	24	37752	1573	25	38003	1520
	Surgical	26	3020	116	22	2667	121	25	3157	126	22	2245	102	24	3297	137	25	2987	119
ĺ	Injections	31	2118	68	28	2232	80	31	2881	93	30	3426	114	31	3201	103	30	3338	111
1	Dressings	25	4115	165	24	3504	146	_ 27	3903	145	22	3427	156	24	4551	190	26	4079	157
	Section	J	uly		A	ugust		S	eptembe	r	Ċ	October		N	lovember			December	
	Medical	25	40337	1613	26	36673	1411	25	34351	1374	25	38522	1541	22	34321	1560	22	30297	1377
	Surgical	25	2854	114	26	2949	113	25	2742	110	25	3123	125	22	2525	115	22	2493	113
l	Injections	31	3037	98	31	2700	87	30	3284	109	31	3143	101	30	3642	121	31	3020	97
	Dressings	26	4021	155	27	3569	132	_26	3504	135	27	3463	128	28	3162	113	24	3029	126

Table A2.2 (contd.)

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APPENDIX - III

SIMULATION OUTPUTS

ENTRY COUNTER - MORNING

With Initial Queue of 50

Program

-; GPSS/PC	Program File	EMEXP1.GPS. (V 2, #	# 38584) 10-24-2002 15:36:42	
10 ****ENTRY	Y COUNTER IN 7	THE MORNING****		
20 ****SCM,	02/07/02, TIN	ME IN SECONDS****		
30 EXP	FUNCTION	RN1,C24		
.0,.0/.1,.1	104/.2,.222/.3	3,.335/.4,.509/.5,.69	9/.6,.915/.7,1.2/.75,1.38/.8,1.6	;/
.84,1.83/.8	38,2.12/.9,2.3	3/.92,2.52/.94,2.81/.	.95,2.99/.96,3.2/.97,3.5/.98,3.9	1
.99,4.6/.99	95,5.3/.998,6	.2/.999,7.0/1.0,8.0		
40 SERV	FUNCTION	RN2,C4		
0.00,0/.29,	,17.5/.90,22.5	5/1.00,27.5		
50 TRNTIME	TABLE	M1,0,150,25	;TRANSIT TIME DISTRIBUTION	
60 QTIM	QTABLE	ENTRY,0,150,25	;ENTRY QUEUE TIME DISTRIBUTION	[
62	GENERATE	,,,50		
64	TRANSFER	,ABC		
70	GENERATE	19,FN\$EXP		
80 ABC	QUEUE	ENTRY	;ENTER QUEUE	
90	SEIZE	ENTRY	;AQUAIRE ENTRY	
100	DEPART	ENTRY	;DEPART QUEUE	
110	ADVANCE	FN\$SERV	;GET THE SLIP	
120	RELEASE 💼	ENTRY	; LEAVE ENTITY	
130	TABULATE	TRNTIME Theses & Dissertan	; TABULATE DISTRIBUTION	
140	TERMINATE	1 www.lib.mrt.ac.lk	; ONE ENTERS	
SAVE EMEXE	P1.GPS			

Output

1000 RUNS

	START_TIME	EN	D_TIME	BLOCKS	FACILITIE	S STO	RAGES	FREI		RY
	0		25310	10	1		0		7552	
LINE	LOC		BLO	СК ТҮРЕ	ENTRY	COUNT	CURF	RENT CO	DUNT	RETRY
62	1		GE	NERATE	_	50		_ (C	0
64	2		TR	ANSFER		50		()	0
70	3		GE	NERATE	1	252		()	0
80	ABC		QU	EUE	1	302		10:	1	0
90	5		SE	IZE	1	201			L	0
100	6		DE	PART	1	200		()	0
110	7		AD	VANCE	1	200		()	0
120	8		RE	LEASE	1	200		()	0
130	9		TA	BULATE	1	200		()	0
140	10		TE	RMINATE	1	200		()	0
FACIL	ITY ENTRI	IES U	TIL.	AVE. TIME	AVAILABLE	OWNER	PEND	INTER	RETRY	DELAY
ENTR	Y 120)1 1.	000	21.07	1	1201	0	0	0	101
QUEUE	MAX	CONT.	ENTRIE	S ENTRIES	(0) AVE.CON	T. AVE.	TIME	AVE.	(-0) RE	ETRY
ÉNTR	Y 102	102	130	2	1 70.69	13	374.24	13	75.30	0

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TABLE	MEAN	STD.DEV.	RETRY	F	ANGE	FREQUENCY	CUM.%
TRNTIME	1431.70	320.93	0				
			0	-	150	7	0.58
			150	-	300	6	1.08
			300	-	450	7	1.67
			450	-	600	7	2.25
			600	-	750	7	2.83
			750	-	900	7	3.42
			900	-	1050	103	12.00
			1050	-	1200	143	23.92
			1200	-	1350	65	29.33
			1350	-	1500	285	53.08
			1500	-	1650	253	74.17
			1650	-	1800	226	93.00
			1800	-	1950	44	96.67
			1950	-	2100	40	100.00
OTIM	1410.61	320.85	0				
-				_	0	1	0.08
			0	_	150	7	0.67
			150	~	300	6	1.17
			300	-	450	7	1.75
			450	-	600	7	2.33
			600	-	750	7	2.92
			750	-	900	7	3.50
			900	-	1050	139	15.08
			1050	-	1200	123	25.33
			1200	-	1350	69	31.08
			1350	-	1500	304	56.42
			1500	-	1650	254	77.58
			1650	-	1800	200	94.25
			1800	-	1950	34	97.08
			1950	_	2100	35	100.00
	100	University of h	Anestuna	Sei	Looko		

University of Moratuwa, Sri Lanka.

Interpretation of Output These & Dissertations

- END_TIME Time taken to generate the required number of customers. In this case, 25310 seconds to generate 1000 patients. Time between arrivals is 19 seconds.
- BLOCKS Number of Block statements used is 10
- FACILITIES- Number of Facilities (servers) in the system is 1, only the ENTRY Facility. Facility can handle only one transaction at a time.
- STORAGES Number of Storages used is 0. Storage can be engaged by more than one transaction at a time.

FACILITY - this statistic show for each facility,

- 1. The number of entries during the run 1201
- 2. The average utilization 1.0
- 3. The average time transaction spent in
- The facility
- 4. Whether the facility was available (1) or not (0)

QUEUE - statistics for each QUEUE includes,

- 1. Maximum queue length 102
- 2. Number of contents at the end 102
- 3. Total number of entries at queue 1302
- 4. Number of entries that didn't have to wait 1
- Average number of contents (Average Queue Length) 71
 Average waiting time 1374 seconds
- 6. Average walting time 1574 seconds
- Average waiting time for those who have to wait -1375 seconds

- 21 seconds

STORAGE - this includes

- 1. The specified capacity (number of facilities)

- The specified capacity (humber of facility)
 The number of storage space unused
 Minimum number of storage
 Number of entries
 Whether the storage entity is available
- 6. The average contents over the run
- 7. Average utilization
- TABLE this gives transit time distribution with mean and standard deviation
- QTABLE this gives queue time frequency distribution with mean and standard deviation.

Similar way other outputs can be explained.

180 RUNS

:	START	_TIME 0	END_TII 377	ME BLOG 0 10	CKS F D	ACI	LITIES 1	STOF	AGES 0	FREE_I	MEMOR 872	Y
LINE		LOC	1	BLOCK T	(PE	Ē	NTRY CO	יזאטכ	CURRE	NT COU	ייזיא	RETRY
62		1		GENERA	re			50	CONNE	0		0
64		2		TRANSFE	ER			50		0		õ
70		3		GENERAT	ΓE		18	31		0		0
80		ABC		QUEUE			23	31		50		0
90		5		SEIZE			18	31		1		0
100		6		DEPART			18	30		0		0
110		7		ADVANCE	2		18	30		0		0
120		8	Ö.	RELEASE	Theres & D	a, sn	18	30		0		0
130		9		TABULAT	ſΈ	155611	18	30		0		0
140		10	0	TERMINA	ATE		18	30		0		0
FACIL	ITY	ENTRIE	S UTIL	. AVE	TIME A	VAI	LABLE	OWNER	PEND	INTER I	RETRY	DELA
ENIK.	1	101	1.000	2	20.83		1	101	0	U	0	50
QUEUE		MAX	CONT. H	ENTRIES	ENTRIES	(0)	AVE.CC	ONT. A	VE.TIM	E AVE	.(-0)	RETR
ENTRY	Y	54	51	231		1	48.81	L	796.5	6 80	00.02	0
TABLE		M	EAN	STD.DE	EV. RETR	ΥI	RANGE		FR	EOUENC	Y CUI	M. 8
TRNT	IME	90	4.36	276.3	30 O					-		
						0 -		150		7	:	3.89
					15	0 -		300		6		7.22
					30	0 -		450		7	1	1.11
					45	0 -		600		7	1	5.00
					60	0 -		750		7	18	3.89
					75	0 -		900		7	22	2,78
					90	0 -	1	050		78	6	5.11
					105	0 -	1	.200		61	100	00.0
QTIM		88	3.42	276.6	55 0							
						-		0		1	(),56
						0 -		150		7	4	1.44
					15	0 -		300		6	-	7.78
					30	0 -		450		7	11	L.67
					45	0 -		600		7	15	5.56
					60	0 -		750		7	19	9.44
					75	0 -		900		7	23	3.33
					90	0 -	1	.050		100	78	3.89
					105	0 -	1	200		38	100).00

ENTRY COUNTER - EVENING

Program

4

10 ****ENTRY COUNTER IN THE EVENING**** 20 ****SCM, 02/07/02, TIME IN SECONDS**** 30 ARRV FUNCTION RN1,D7 ;TIME BETWEEN ARRIVALS DISTRIBUTIO .65,10/.83,30/.91,50/.94,70/.96,90/.98,110/1.00,170 40 SERV FUNCTION RN2, D4 ;SERVICE TIME DISTRIBUTION .04,17.5/.25,22.5/.88,27.5/1.00,32.5 TABLEM1,0,150,25;TRANSIT TIME DISTRIBUTIONQTABLEENTRY,0,150,25;ENTRY QUEUE TIME DISTRIBUTIONGENERATEFN\$ARRV;PATIENTS ARRIVE 50 TRNTIME TABLE QTABLE GENERATE FN\$ARK ENTRY 60 QTIM 70 ;ENTER QUEUE 80 90 SEIZE ENTRY ;AQUAIRE ENTRY ENTRY 100 DEPART ;DEPART QUEUE ;GET THE SLIP 110 ADVANCE FN\$SERV ENTRY TRNTIME ;LEAVE ENTITY ;TABULATE DISTRIBUTION 120 RELEASE TABULATE 130 140 TERMINATE ;ONE ENTERS 1

Output

300 RUNS

	START_	TIME 0	END_TIM 8072	E BLOCKS 8	FAC	ILITIE: 1	S STC	RAGES 0	FREE	E_MEMO 14640	RY
LINE		LOC	В	LOCK TYPE		ENTRY (COUNT	CURF	RENT CO	TNUC	RETRY
70		1		GENERATE			311		- ()	0
80		2	12	QUEUE	doratuwa, S	ri Lanka.	31 1		10)	0
90		3		SEIZE	ses & Disse	rtations	301		1	L	0
100		4	8	DEPART	c.lk		30 0		()	0
110		5		ADVANCE			30 0		()	0
120		6		RELEASE			300		()	0
130		7		TABULATE			300		()	0
140		8	'	TERMINATE		-	300		()	0
FACIL	ITY 1	ENTRIES	UTIL.	AVETI	ME AVAI	LABLE	OWNER	PEND	INTER	RETRY	DELAY
ENTR	Y	301	0.978	26.2	3	1	301	0	0	0	10
QUEUE		MAX (CONT. EN'	TRIES ENT	RIES(0)	AVE.CO	ONT. A	VE.TIM	IE AVE	E.(-0)	RETRY
ENTR	Y	25	11	311	13	9.38	8	243.4	8 2	254.10	0
TABLE		ME	EAN	STD.DEV.	RETRY	RANGE		E	REQUEN	ICY C	UM.%
TRNT	IME	272	2.82	191.23	0						
					0	-	150		126		42.00
					150	-	300		37	1	54.33
					300	-	450		70		77.67
					450	-	600		55		96.00
					600	-	750		12	10	00.00
QTIM		246	5.50	190.93	0						
					-		0		13	4	4.33
					0 -		150		124	4 9	5.67
					150 -		300		29	55	5.33
					300 -		450		83	83	3.00
					450 -		600		41	90	6.67
500	RUNS				600 -		750		10	100	0.00
9	START_	FIME	END_TIM	E BLOCKS	FAC:	ILITIES	S STO	RAGES	FREE	_MEMOR	RY
		0	13317	8		1		0	1	4784	
LINE		LOC	BI	LOCK_TYPE	ł	ENTRY_C	COUNT	CURR	ENT_CC	UNT	RETRY
/0		1	(JENERATE		5	513		0)	0
80		2	(JUEUE		5	513		12		0

90 100 110 120 130 140	3 4 5 6 7 8		SEIZE DEPART ADVANCE RELEASE FABULATE FERMINAT	c re			501 500 500 500 500 500			L D D D D	0 0 0 0 0
FACILITY ENTRY	ENTRIES 501	UTIL. 0.986	AVE. 1 26	TIME AV 5.23	AIL	ABLE 1	OWNER 501	pend 0	INTER 0	retry 0	DELAY 12
QUEUE ENTRY	MAX Co 26	ONT. ENT 13	FRIES EN 513	NTRIES	(0) .3	AVE.C 12.	CONT. A' .48	VE.TIN 323	ME AVE .96	E.(-0) 332.3	RETRY 8 0
TABLE TRNTIME	ME2 351	AN .56	STD.DEV 195.91	7. RETF 0 15 30	0 - 0 - 00 -	RANGE	150 300 450	I	FREQUEN 126 65 136	1CY C	UM.% 25.20 38.20 65.40
QTIM	325	.28	195.76	45 60 5 0 15 30 45 60	- 00 - 00 - 00 - 00 - 00 - 00 -		600 750 150 300 450 600 750		112 61 13 124 62 156 100 45	1	2.60 27.40 39.80 71.00 91.00 00.00
700 RONS											
START	_TIME H 0	END_TIME 18637	E BLOCK 8	(S F	ACI	LITIE 1	es stoi	RAGES 0	FREE 1	С_МЕМО 4720	RY
LINE 70 80 90 100 110 120 130 140	LOC 1 2 3 4 5 6 7 8	BI C C C C C C C C C C C C C C C C C C C	LOCK_TYF SENERATE DEFART DEFART ADVANCE RELEASE CABULATE CERMINAT	PE Moratuw heses & D ne Ik	E issert	NTRY_	COUNT 709 701 700 700 700 700 700 700	CURF	XENT_CC 6 8 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DUNT) -))))	RETRY 0 0 0 0 0 0 0 0 0
FACILITY ENTRY	ENTRIES 701	UTIL. 0.988	AVET 26	IME AV 5.27	AIL	ABLE 1	OWNER 701	pend 0	INTER 0	retry 0	DELAY 8
QUEUE ENTRY	MAX CC 26	ONT. ENI 9	RIES EN 709	TRIES(1	0) . 7	AVE.C 11.	CONT. AV 49	/E.TIM 302.	1E AVE 00	.(-0) 309.4	RETRY 1 0
TABLE TRNTIME	ME# 330.	AN . 92	STD.DEV 183.95	. RETR 0	Y	RANGE	;	F	REQUEN	ICY CI	UM.∛
OTIM	304	62	183 83	6 12 18 24 30 36 42 48 54 60 66	0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 -		60 120 180 240 300 360 420 480 540 600 660 720		55 58 88 62 30 56 98 104 52 33 54 10		7.86 16.14 28.71 37.57 41.86 49.86 63.86 63.86 78.71 86.14 90.86 98.57 00.00
QT IM	304.	02	183.82	0 6 12 18	- 0 - 0 - 0 - 0 -		0 60 120 180 240		17 59 85 66 53		2.43 10.86 23.00 32.43 40.00

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240	-	300	30	44.29
300	-	360	72	54.57
360	-	420	117	71.29
420	-	480	80	82.71
480	-	540	37	88.00
540	-	600	37	93.29
600	-	660	45	99.71
660	-	720	2	100.00

STAFF COUNTER - MORNING

Program

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; GPSS/PC	Program File (COUNTSTFM1.GPS.	(V 2,	# 38	584)	10-28-2002	11:02:43
10 ****STAF	F COUNTER IN 7	THE MORNING****					
20 ****SCM,	02/07/02, TIMH	E IN SECONDS****					
22 STAF	STORAGE	2	;	2 STA	FF COU	NTERS	
30 ARRV	FUNCTION	RN1,D5	;	TIME 1	BETWEEL	N ARRIVALS	DIST
.13,75/.43,	105/.71,135/.9	91,165/1.00,195					
40 SERV	FUNCTION	RN2,D5	;	SERVI	CE TIM	E DISTRIBUT	FION
.14,180/.35	,240/.78,300/.	.88,360/1.00,420					
50 TRNTIME	TABLE	M1,0,150,25					
60 STAFFQ	QTABLE	STAFF,0,150,25					
62 STFF	FUNCTION	RN3,D2					
.5,1/1.0,2							
70	GENERATE	FN\$ARRV					
72	ASSIGN	1,FN\$STFF					
80	QUEUE	STAFF					
90	SEIZE	P1					
100	DEPART	STAFF					
110	ADVANCE	FN\$SERV					
120	RELEASE 📃	Pliniversity of Moratuwa	, Sri Lani	ka.			
130	TABULATE 🤇 🌑	TRNTIME Theses & Dis	scrtabler	TABULI	ATE DI	STRIBUTION	
140	TERMINATE 🎫	1www.lib.mrt.ac.lk					

Output

200 RUNS

	START	TIME 0	END_TIM 31200	E BLOC	CKS	FACI	LITIE 2	S ST	ORAGE	S	FREE	_MEMO	RY
		Ŭ	01200	-	•		2		-		-	2171	
LINE		LOC	В	LOCK TY	PE	E	NTRY	COUNT	CU	RRE	NT СС	UNT	RETRY
70		1		GENERAT	ĽΕ		_	241			- o		0
72		2		ASSIGN				241			0		0
80		3		QUEUE				241			39		0
90		4		SEIZE				202			1		0
100		5		DEPART				201			0		0
110		6		ADVANCE	2			201			1		0
120		7		RELEASE	2			200			0		0
130		8		TABULAI	Έ			200			0		0
140		9		TERMINA	ATE			200			0		0
FACIL DELAY	ITY	ENTRI	ES UTIL.	AVE.	_TIME	AVAI	LABLE	OWN	ER PE	ND	INTER	RETR	ť
1		104	1 0.990	29	97.12		1	17	6 C		0	0	32
2		98	3 0.925	29	4.80		1	23	0 0		0	0	7
QUEUE		MAX	CONT. EN	TRIES E	NTRIE	S(0)	AVE.C	ONT. A	AVE.T	IME	AVE	. (-0)	RETRY
STAF	F	40	40	241		9	19.	69	254	9.0	0 2	647.8	ə 0
STORA	GE	CAP.	REMAIN.	MIN.	MAX.	ENTR	IES A	VL. Z	AVE.C	. U	TIL.	RETRY	DELAY
STAF			2 2	0	0		0	1	0.0	0	0.000	0	0

TABLE	MEAN	STD.DEV.	RETRY	RANGE		FREQUENCY	CUM.%
TRATINE	2042.02	23/4.07	150	-	300	8	4 00
			300	_	450	10	9.00
			450	_	400	16	17 00
			600		750	10	22 50
			750	_	900	11	22.50
			900	_	1050	11	35 00
			1050	_	1200	тт 5	37 50
			1200	_	1350	2	42 00
			1350	-	1500	8	42.00
			1500	_	1650	14	52 00
			1650		1000	14 E	55.00
			1000	-	1050	5	55.50
			1000	-	2100	9	60.00
			1950	-	2100	5	62.50
			2100	-	2250	2	63.50
			2400	~	2550	1	64.00
			2550	-	2700	2	65.00
			2700	- :	2850	2	66.00
			3000	- :	3150	2	67.00
			3150	- :	3300	1	67.50
			3300		3450	2	68.50
			3450	-		63	100.00
STAFFQ	2338.73	2368.67	0				
					0	9	4.48
			0	-	150	9	8.96
			150	-	300	18	17.91
			300	-	450	9	22.39
			450	-	600	14	29.35
			600	-	750	9	33.83
			750	-	900	9	38.31
			900		1050	8	42.29
		University of I	1050	Sri Lanka.	1200	9	46.77
		Electronic The	1200	rtations	1350	8	50.75
	65	www.lib.mrt.a	^{clk} 1350	- :	1500	10	55.72
			1500	- :	1650	9	60.20
			1650	- :	1800	6	63.18
			1800	- :	1950	1	63.68
			2100	- 2	2250	1	64.18
			2250	- 2	2400	1	64.68
			2400	- 3	2550	2	65 67
			2550	- 3	2700	2	66 67
			2850	_ 7	3000	2	67 66
			3000	_ `	3150	2	68 66
			3150	_ `	3300	- 1	69 15
			3300		3450	с Т	70 65
			3450	- ``		5	100 00
			7400			J 9	100.00

STAFF COUNTER - EVENING

Program

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; GPSS/PC Program File COUNTSTFE.GPS. (V 2, # 38584) 10-28+2002 11:27:32 10 ****STAFF COUNTER IN THE EVENING**** 20 ****SCM,02/07/02, TIME IN SECONDS**** 22 STAF STORAGE 2 ;2 STAFF COUNTERS 30 ARRV FUNCTION RN1,D4 ;TIME BETWEEN ARRIVALS DIST .18,150/.40,210/.74,270/1.00,330 40 SERV FUNCTION RN2, D5 ;SERVICE TIME DISTRIBUTION .20,240/.32,300/.73,360/.90,420/1.00,480 50 TRNTIME TABLE M1,0,150,25 60 STAFFQ QTABLE STAFF,0,150,25 62 STFF FUNCTION RN3,D2 .5,1/1.0,2 70 FN\$ARRV 1,FN\$STFF GENERATE 72 ASSIGN

1

80 90 100 110 120 130 140	QUEUE SEIZE DEPART ADVANCE RELEASE TABULAT TERMINA	ST/ P1 ST/ FN: P1 E TRN TE 1	AFF AFF \$SERV NTIME	;	TABULATE	E DISTRI	BUTION	
Output							1	3 /
60 RUNS								
START_	_TIME 0	END_TIME 15930	BLOCKS 9	FACILII 2	TIES STO	DRAGES 1	FREE_MÉ 1641	MORY 6
LINE 70 72 80 90 100 110 120 130 140	LOC 1 2 3 4 5 6 7 8 9	BLC GF AS QU SF DF AT RF T7 TF	OCK_TYPE ENERATE SSIGN JEUE EIZE EPART OVANCE ELEASE ABULATE ERMINATE	ENTR	EY_COUNT 62 62 62 62 61 61 60 60 60	CURRE	NT_COUNT 0 0 1 0 1 0 1 0 0 0 0	RETRY 0 0 0 0 0 0 0 0 0 0 0
FACILITY 1 2	ENTRIES 38 24	UTIL. 0.839 0.510	AVETIM 352.1 338.7	NE AVAILABL 1 1 5 1	E OWNEF 61 62	R PEND I 0 2 0	NTER RET O O	RY DELAY O O O O
QUEUE STAFF	MAX CO 3	ONT. ENTF 1	RIES ENTR 62	IES(0) AVE 29	.CONT. A 0.55	AVE.TIME 140.8	AVE.(- 1 264	0) RETRY .55 0
STORAGE STAF	CAP. 1 2	REMAIN. M 2	MIN. MAX 0	C. ENTRIES	AVL. A	VE.C. U 0.00	TIL. RET 0.000	RY DELAY 0 0
TABLE TRNTIME	ME <i>1</i> 495	AN S	TD.DEV. 223.72	RETRY RAN 0 150 - 300 - 450 - 600 - 750 - 900 -	GE 300 450 600 750 900 1050	FR	EQUENCY 12 22 10 7 6 3	CUM. % 20.00 56.67 73.33 85.00 95.00 100.00
STAFFQ	137	.21	186.10	0 - 0 - 150 - 300 - 450 - 600 -	0 150 300 450 600 750		29 12 9 6 4 1	47.54 67.21 81.97 91.80 98.36 100.00
100 RUNS								
START_	TIME E	END_TIME 26100	BLOCKS 9	FACILIT 2	IES STO	RAGES	FREE_MEN 1640	MORY D

			-		
LINE	LOC	BLOCK_TYPE	ENTRY COUNT	CURRENT COUNT	RETRY
70	1	GENERATE	_103	- 0	0
72	2	ASSIGN	103	0	0
80	3	QUEUE	103	1	0
90	4	SEIZE	102	1	0
100	5	DEPART	101	0	0
110	6	ADVANCE	101	1	0
120	7	RELEASE	100	0	0
130	8	TABULATE	100	0	0

*

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140	9	,	TERMIN	ATE			100		(0	0
FACILITY 1 2	ENTRIES 61 41	UTIL. 0.813 0.542	AVE. 3 3	_TIME 48.20 45.37	AVAI	LABLI 1 1	E OWNE 10 10	ER PEND 01 0 02 0	INTER 0 0	RETRY 0 0	DELAY 0 1
QUEUE STAFF	MAX (3	CONT. EN' 2	TRIES 103	ENTRI	ES(0) 47	AVE (.CONT. 0.49	AVE.TII 123	ME AVI .50	E.(-0) 227.1	RETRY 4 0
STORAGE STAF	CAP. 2	REMAIN. 2 2	MIN. O	MAX. 0	ENT	RIES 0	AVL. 1	AVE.C. 0.00	UTIL. 0.000	RETRY D 0	DELAY 0
TABLE TRNTIME	ME 4 7 1	CAN 60	STD.D 195.	EV. RH 22	O 150	RANG	GE		FREQUE	102 YON	UM.%
					150 300 450	-	450 600)	20 42 17	(20.00 52.00 79.00
					600 750 900	- - -	750 900 1050)))	11 7 3	10	90.00 97.00 00.00
STAFFQ	120	0.00	164.	32	0	-	()	47		16.53
					0 150 300	- - -	150 300 450)))	25 14 10	8	71.29 35.15 95.05
					450 600	-	600 750)	4	10	99.01 00.00

ROOM 15 - MORNING

Program

FIOGIAM			
		University of Moratuwa, Sri L	anka.
		Electronic Theses & Dissertat	ions
; GPSS/PC 1	Program File	COUNT2R15M.GPS. (V 2	2, # 38584) 10-28-2002 11:46:52
10 ****ROOM	15 IN THE MOI	RNING****	
20 ****SCM,	02/07/02, TIM	E IN SECONDS****	
22 ROM15	STORAGE	12	;12 STAFF COUNTERS
30 ARRV	FUNCTION	RN1, D10	;TIME BETWEEN ARRIVALS DIST
.33,5/.57,19	5/.78,25/.86,3	35/.90,45/.93,55/.95,	65/.97,75/.98,85/1.00,115
40 SERV	FUNCTION	RN2,D5	;SERVICE TIME DISTRIBUTION
.14,180/.35	,240/.78,300/	.88,360/1.00,420	
50 TRNTIME	TABLE	M1,0,150,25	
60 ROOM15Q	QTABLE	ROOM15,0,150,25	
62 RM15	FUNCTION	RN3, D12	
.08,1/.17,2,	1.25,3/.33,4/	.42,5/.50,6/.58,7/.67	,8/.75,9/.83,10/.92,11/1.00,12
70	GENERATE	FN\$ARRV	
72	ASSIGN	1,FN\$RM15	
80	QUEUE	ROOM15	
90	SEIZE	P1	
100	DEPART	ROOM15	
110	ADVANCE	FN\$SERV	
120	RELEASE	P1	
130	TABULATE	TRNTIME	; TABULATE DISTRIBUTION
140	TERMINATE	1	

Output

1000 RUNS

WARNING: interactions during simulation.

	START_TIME	END_TIME	BLOCKS	FACILITIES	STORAGES	FREE_ME	MORY
	0	26395	9	12	1	512	
LINE	LOC	BLOC	K_TYPE	ENTRY_COU	NT CURREN	IT_COUNT	RETRY
	1	GEN	ERATE	1142		- 0	0
	2	ASS	IGN	1142		0	0
	3	QUE	UE	1142		131	0

FACILITY 1 2 3 4 5 6 7 8 9 10 11 12	4 5 6 7 8 9 ENTRIES UTIL 89 0.93 83 0.91 81 0.90 82 0.89 93 0.99 77 0.86 78 0.85 84 0.93 84 0.90 79 0.88 92 0.96 89 0.99	SEIZE DEPART ADVANCE RELEASE TABULATE TERMINATE . AVETIME # 3 276.85 8 292.05 0 293.40 5 288.23 8 283.28 3 295.97 0 287.69 4 293.57 2 283.51 5 295.70 4 276.68 7 295.84	AVAILABLE 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	011 010 000 000 000 000 000 000 000 000	PEND I 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
QUEUE ROOM15	MAX CONT. 132 132	ENTRIES ENTRIES 1142	S(O) AVE.C 97 57.	CONT. AV 10	/E.TIME 1319.7	AVE.(- 2 1442	0) RETRY .22 0
STORAGE ROM15	CAP. REMAI 12 1	N. MIN. MAX. 2 0 0	ENTRIES A O	VL. AV 1	/E.C. U 0.00	TIL. RET 0.000	RY DELAY 0 0
TABLE TRNTIME	MEAN 1517.57	STD.DEV. RET 1066.19 (IRY RANGE		FR	EQUENCY	CUM.%
TABLE	MEAN	University of Mars 9 Pectrome Theses 4 STD.DEV. RET 10 12 13 15 16 18 19 21 22 24 25 27 26 30 31 33 34	150 - 300 - 450 - 450 - 750 - 750 - 900 Set Lanka Discretations FRY RANGE 050 - 200 - 350	300 450 600 750 900 1050 1200 1350 1500 1650 1800 1950 2100 2250 2400 2550 2400 2550 2700 2850 3000 3150 3300 3450	FR	78 76 73 53 52 EQUENCY 56 62 56 44 44 49 32 32 37 29 19 15 16 16 16 16 16 8 10 70	7.80 15.40 22.70 30.00 35.30 40.50 CUM.% 46.10 52.30 57.90 62.30 66.70 71.60 74.80 78.00 81.70 84.60 86.50 88.00 89.60 91.20 92.00 93.00 100.00
ROOM15Q	1241.91	1081.05 0 1 3 4 6 7 9 10 12 13 15 16	- 50 - 300 - 50 -	0 150 300 450 600 750 900 1050 1200 1350 1500 1650 1800		97 47 83 68 60 49 52 62 57 52 43 44 37	9.60 14.26 22.48 29.21 35.15 40.00 45.15 51.29 56.93 62.08 66.34 70.69 74.36

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1800	-	1950	43	78.61
1950	-	2100	26	81.19
2100	-	2250	27	83.86
2250	-	2400	18	85.64
2400	-	2550	15	87.13
2550	-	2700	19	89.01
2700	-	2850	15	90.50
2850	-	3000	12	91.68
3000	-	3150	10	92.67
3150	-	3300	15	94.16
3300	-	3450	11	95.25
3450	-		48	100.00

ROOM 15 - EVENING

Program

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; GPSS/PC	Program File	COUNT2RM15E.GPS. (V	2.	# 3858	4)	10-28-200	2 12:15:57
10 ****ROOM	15 IN THE EV	ENING****	•				
20 ****SCM,	02/07/02, TIM	E IN SECONDS****					
22 ROM15	STORAGE	8	;12	STAFF (COUN	TERS	
30 ARRV	FUNCTION	RN1,D7	;TIM	E BETWI	EEN	ARRIVALS I	DIST
.66,10/.77,	30/.84,50/.90	,70/.94,90/.97,110/1	.00,	170			
40 SERV	FUNCTION	RN2,D5	;SE	RVICE '	TIME	DISTRIBU	FION
.20,240/.32	,300/.73,360/	.90,420/1.00,480					
50 TRNTIME	TABLE	М1,0,150,25					
60 ROOM15Q	QTABLE	ROOM15,0,150,25					
62 RM15	FUNCTION	RN3,D8					
.13,1/.25,2	/.38,3/.50,4/	.63,5/.75,6/.88,7/1.	00,8				
70	GENERATE	FN\$ARRV					
72	ASSIGN	1,FN\$RM15	anka				
80	QUEUE	ROOM15	ione				
90	SEIZE	P1	nons				
100	DEPART	ROOM15					
110	ADVANCE	FN\$SERV					
120	RELEASE	P1					
130	TABULATE	TRNTIME	; TAI	BULATE	DIS	TRIBUTION	
140	TERMINATE	1					

Output

200 RUNS

5	START_	TIME	END_TIM	E BLOCKS	FACILITIES	STOR	AGES	FREE	MEMOR	Y
		0	9300	9	8		1	-	144	
LINE		LOC	B	LOCK_TYPE	ENTRY_C	OUNT	CURRI	ENT CO	UNT	RETRY
70		1	(GENERATE	_3	38		_ 0		0
72		2	i	ASSIGN	3	38		0		0
80		3	Ģ	QUEUE	3	38		130		0
90		4	:	SEIZE	2	08		1		0
100		5	1	DEPART	2	07		0		0
110		6	Ì	ADVANCE	2	07		7		0
120		7	H	RELEASE	2	00		0		0
130		8	ŗ	FABULATE	2	00		0		0
140		9	r	FERMINATE	2	00		0		0
FACILI	ITY	ENTRIES	UTIL.	AVETIME	AVAILABLE	OWNER	PEND	INTER	RETRY	
DELAY		26	0 0 0 1	254 60	1	1.68	<u>^</u>	0	0	
1 Q		26	0.991	354.62	1	16/	0	0	0	20
2		26	0.980	350.77	1	254	0	0	0	11
3		27	0.987	340.00	1	151	0	0	0	25
4		27	0.996	343.33	1	231	0	0	0	19
5		26	0.997	356.92	1	161	0	0	0	22
6		25	0.924	344.00	1	251	0	0	0	10

7	26 0.887	317.31	1 1	86 0 0	0 19
8	25 0.949	353.20	1 2	87 0 0	0 4
QUEUE	MAX CONT.E	NTRIES ENTRIES(0)	AVE.CONT.	AVE.TIME 2	AVE.(-0) RETRY
ROOM15	132 131	338 15	67.14	1847.34	1933.13 0
STORAGE	CAP. REMAIN	. MIN. MAX. ENI	RIES AVL.	AVE.C. UTI:	L. RETRY DELAY
ROM15	12 12	0 0	0 1	0.00 0.0	DOO O O
TABLE TRNTIME	MEAN 2008.95	STD.DEV. RETRY 1250.97 0	RANGE	FREQU	JENCY CUM.%
	2000.93	1230.37 150 300 450 600 750 900 1050 1200 1350 1500 1650 1800 1950 2100 2250 2400 2550 2700 2850 3000 3150 3300	- 30 - 45 - 60 - 75 - 90 - 105 - 120 - 135 - 150 - 165 - 165 - 165 - 195 - 210 - 255 - 240 - 255 - 240 - 255 - 240 - 330 - 315 - 330 - 345 - 345		$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
ROOM15Q	1721.26	Electronic These & Diss 1304.911 ac 10 0 150 300 450 600 750 900 1050 1200 1350 1500 1650 1800 1950 2100 2250 2400 2550 2700 2850 3000 3150 3300 3450	- 15 - 30 - 45 - 60 - 75 - 90 - 105 - 120 - 120 - 135 - 150 - 165 - 180 - 195 - 210 - 225 - 240 - 255 - 240 - 255 - 270 - 285 - 300 - 315 - 330 - 345 - 345	0 1 0 0 0 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 0 1 0 0 0 0 1 0	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

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INJECTION ROOM

Program

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; GPSS/PC Program File RM3INJECTION.GPS. (V 2, # 38584) 10-28-2002 16:53:45 20 *******SCM, 02/07/02, TIME IN MINUTES*** 20TRNTIMETABLEM1,0,60,20;TRANSIT TIME DISTRIBUTION30INJECQQTABLEINJEC,0,60,20;INJEC QUEUE TIME DISTRIBUTION42ARRVFUNCTIONRN1,D5;TIME BETWEEN ARRIVALS DIST .16,75/.68,225/.80,375/.89,525/1.00,675 44 SERV FUNCTION RN2, D5 ;SERVICE TIME DISTRIBUTION .05,180/.26,240/.63,300/.90,360/1.00,420 GENERATE FN\$ARRV QUEUE INJEC 50 60 ;ENTER INJEC QUEUE SEIZE DEPART SEIZE INJEC DEPART INJEC ADVANCE FN\$SERV RELEASE INJEC TABULATE TRNTIME 70 ;ENGAGE INJEC COUNTER 80 ;DEPART QUEUE 90 ;DISENGAGE INJEC COUNTER ;TABULATE DISTRIBUTION 100 110 TERMINATE 1 120 ;ONE ENTERS

Output

150 RUNS

	START_	_TIME 0	END_TIN 4887(1E BLOCKS) 8	FAG	LILITIE 1	ES STOI	RAGES 0	FREE_M 154	EMORY 24
LINE 50 60 70 80 90 100 110 120		LOC 1 2 3 4 5 6 7 8		BLOCK TYPE GENERATE QUEUE SEIZE DEPART ADVANCE RELEASE TABULATE TERMINATE	loratuwa, ies & Diss ilk	ENTRY_ Sri Lanka ertabons	COUNT 164 151 150 150 150 150 150	CURRE	ENT_COUN 0 13 1 0 0 0 0 0 0	T RETRY 0 0 0 0 0 0 0 0 0 0
FACIL INJE	ITY C	ENTRIES 151	UTIL. 0.961	AVETIN 311.1	ME AVA: 13	LABLE 1	OWNER 151	PEND 1 0	INTER RE' O	TRY DELAY 0 13
QUEUE INJE	с	MAX 15	CONT. EN 14	ITRIES ENTE 164	RIES(0) 10	AVE.C	СОМТ. АМ 45	/E.TIME 1327.2	E AVE.(23 141	-0) RETRY 3.41 0
TABLE TRNT	IME	M 156	EAN 6.60	STD.DEV. 1150.73	RETRY 0 180 240 300 360 420 480 540 600 660 720 780 840 900 960 1020 1080	RANGE	240 300 360 420 480 540 600 660 720 780 840 900 960 1020 1080	FF	REQUENCY 2 6 4 8 5 5 6 4 2 7 6 6 2 5 4 7 8	CUM. % 1.33 5.33 8.00 13.33 16.67 20.00 24.00 26.67 28.00 32.67 36.67 40.67 42.00 45.33 48.00 100.00

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-	0	10	6.67
0 -	60	2	8.00
60 -	120	7	12.67
120 -	180	7	17.33
180 -	240	5	20.67
240 -	300	5	24.00
300 -	360	6	28.00
360 -	420	2	29.33
420 -	480	5	32.67
480 -	540	5	36.00
540 -	600	4	38.67
600 -	660	5	42.00
660 -	720	6	46.00
720 -	780	5	49.33
780 -	840	5	52.67
840 -	900	2	54.00
900 -	960	3	56.00
960 -	1020	6	60.00
1020 -	1080	2	61.33
1080 -		58	100.00

SURGICAL ROOM

1. One Common Line

Program

;	GPSS/PC H	Program File H	RM18SURGICAL.GPS. (V	/ 2, # 38584) 10-28-2002
17:	:05:26			
10	*******	*ROOM 18 -SUF	GICAL**********	
20	*******	SCM, 15/07/02,	TIME IN SECONDS***	anka.
22	ROOMS	STORAGE (2Electronic Theses & Dissertat	2 COUNTERS AT ROOM 18
30	TRNTIME	TABLE 📨	M1,0,60,20	;TRANSIT TIME DISTRIBUTION
40	ROOM18Q	QTABLE	ROOM18,0,60,20	;ROOM5 QUEUE TIME DISTRIBUTION
42	ARRV	FUNCTION	RN1, D5	TIME BETWEEN ARRIVALS DIST
.70),75/.84,2	225/.91,375/.9	7,525/1.00,675	
44	SERV	FUNCTION	RN2,D5	;SERVICE TIME DISTRIBUTION
.11	1,180/.35,	240/.67,300/.	86,360/1.00,420	
46	ROM18	FUNCTION	RN3,D2	
. 4 9	9,1/1.0,2			
50		GENERATE	FN\$ARRV	
52		ASSIGN	1,FN\$ROM18	
60		QUEUE	ROOM18	;ONE QUEUE FOR 3 COUNTERS
70		SEIZE	P1	; ; ; ENGAGE FIRST COUNTER
80		DEPART	ROOM18	; DEPART ROOM5 QUEUE
90		ADVANCE	FN\$SERV	
100)	RELEASE	P1	;DISENGAGE COUNTER1
110)	TABULATE	TRNTIME	
120)	TERMINATE	1	

Output

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100 RUNS

	START_TIME	END_TIME	BLOCKS	FACILITIES	STORAGES	FREE MEMO	ORY
	0	18660	9	2	1	15632	
LINE	LOC	BLO	CK_TYPE	ENTRY_CO	UNT CURR	ENT COUNT	RETRY
50	1	GE	NERATE	10	4	_ ₀	0
52	2	AS	SIGN	10	4	0	0
60	3	QU	EUE	10	4	3	0
70	4	SE	IZE	10	1	0	0
80	5	DE	PART	10	1	0	0
90	6	AD	VANCE	10	1	1	0
100	7	RE	LEASE	10	0	0	0

110 120	8 9	TABULATE TERMINATE		100 100	0 0	0 0
FACILITY	ENTRIES UTI 57 0.9	L. AVETIME	E AVAILABLE	E OWNER 99	PEND INTER	RETRY DELAY
2	44 0.7	300.00) 1	0	0 0	0 0
QUEUE ROOM18	MAX CONT. 7 3	ENTRIES ENTRI 104	ES(0) AVE 23 2	.CONT. AV 2.46	E.TIME AVE 441.35	.(-0) RETRY 566.67 0
STORAGE ROOMS	CAP. REMA 2	IN. MIN. MAX. 2 0 0	ENTRIES	AVL. AV 1	E.C. UTIL. 0.00 0.000	RETRY DELAY 0 0
TABLE TRNTIME	MEAN 735.60	STD.DEV. F 415.08	CETRY RANG	GE	FREQUEN	CY CUM.%
		120100	120 -	180	1	1.00
			180 -	240	4	5.00
			240 -	300	11	16.00
			300 -	360	5	21.00
			360 -	420	8	29.00
			420 -	480	6	35.00
			480 -	540	6	41.00
			540 -	600	6	47.00
			600 -	660	5	52.00
			660 -	720	9	61.00
			720 -	780	⊃ ∡	66.00
			840 -	900	4 5	70.00
			960 -	1020	2	77.00
			1020 ~	1020	2	79.00
			1080 -		21	100.00
TABLE	MEAN	STD.DEV. R	ETRY RANG	ΞE	FREQUEN	CY CUM. %
ROOM18Q	434.11	409.89	0		-	
		University of Mor	ratuwa, Szi Lank	a. 0	23	22.77
	C.	Electronic Theses	& Diosentations	60	1	23.76
	-	www.lib.mrt.ac.lb	60 -	120	4	27.72
			120 -	180	5	32.67
			180 -	240	8	40.59
			240 -	300	8	48.51
			300 -	360	8	56.44
			360 -	420	3	59.41
			420 -	480	3	62.38
			480 -	540	2	70 20
			540 - 600 -	660	د ج	75.25
			660 -	720	ے ۵	79 21
			720 -	780	2	81.19
			780 -	840	2	83.17
			900 -	960	3	86.14
			960 -	1020	3	89.11
			1020 -	1080	1	90.10
			1080 -		10	100.00

2. Two Separate Lines

Program

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46 ROM18	FUNCTION	RN3, D2
.49,1/1.0,2		· · · · · · · · · · · · · · · · · · ·
48	GENERATE	,,,25
50	TRANSFER	, ABC
52	GENERATE	FN\$ARRV
60 ABC	QUEUE	ROOM18
62	TRANSFER	BOTH, COUNT1, COUNT2
64 COUNT1	SEIZE	COUNTER1
66	DEPART	ROOM18
68	ADVANCE	FN\$SERV
70	RELEASE	COUNTER1
80 COUNT2	SEIZE	COUNTER2
84	DEPART	ROOM18
90	ADVANCE	FN\$SERV
100	RELEASE	COUNTER2
110	TABULATE	TRNTIME
120	TERMINATE	1

Output

100 RUNS

	START	_TIME	END		ME BL	0CK5	5	FA	CII	.ITI	IES	STO	RAGES		FREI	E_MEM	OR	Y
LINE	Ξ	LOC	5	F	BLOCK	туря Туря	7		ΕN	Z ITRY	cot	INT	CUR	REN	т со	2120 Yunt	,	RETRY
48	_	1		_	GENER	ATE	-				2	5	0011		1-°	0		0
50		2			TRANS	FER					2	5			(0		õ
52		3			GENER	ATE					17	7			(2		õ
60		ABC			OUEUE						202	2			(5		0
62		5			TRANS	FER				1	059	3			100	- 0		0
64		COUNT	1		SEIZE						9	Э			{	-)		0
66		7			DEPAR	т					9	Э			(5		õ
68		8			ADVAN	CE					9	9				1		Ő
70		9		õ.	RELEA	SE	Morat	uwa,	SEL	Lank	98	3			(5		0
80		COUNT	2		SEIZE	or the	escs or	10188	961 I.J		10:	L			-	1		0
84		11			DEPAR	Т	n. 1h				100)			(C		0
90		12			ADVAN	CE					100)			(D		0
100)	13			RELEA	SE					100)			(C		0
110)	14			TABUL	ATE					100)			(D		0
120)	15			TERMI	NATE	2				100)			(0		0
FACII	JITY	ENTRI	es u	TIL.	AV	Е. Т	IME	AVA	ΑIL	ABL	E OV	NER	PEND	INT	ΓER	RETR	ΥI	DELAY
COUN	VTER1	99) 1.	000		308.	48		1			99	0		0	100		0
COUN	ITER2	10:	1.	000		302.	38		1			98	0		0	100		0
QUEUE	2	MAX	CONT	. EN	TRIES	ENT	RIES	5(0)	A	VE.	CONI	. A	VE.TI	ЧE	AVE	E.(-0) F	RETRY
ROOM	118	27		3	202			5		11	.18		1690	.77	1	.733.	68	0
STORA	AGE	CAP	REM	AIN.	MIN.	MA	x.	ENT	rri	ES	AVL.	A	VE.C.	UTI	L.	RETR	ΥĽ	DELAY
ROOM	1S		2	2	0		0			0	1		0.00	0.	000) (C	0
TABLE	2	1	IEAN		STD.	DEV.	REI	RY	R	ANG	Е		1	FREC	QUEN	ICY (CUN	1.8
TRNT	IME	1010	94.90		5095	.93	0)) / ()	_		-	00			1		1	0.0
							ے د	.40 .40	_		Ē	00			1		2	> 00
							F	500	_		6	60			1			2.00
							2 P	140	_			000			1		-	1 00
							c	000	_		c	60			2			5 00
							10	20	-		10	80			2		Ę	2 00
							10	80	_		10	00			92		וחר	
ROOM	118Q	957	9.72		5006	. 52	C	1							52	-		
									-			0			5		2	2.51
								60	-		1	20			2		3	3.52
							1	20	-		1	80			1		4	.02
							2	40	-		3	00			1		4	.52
							3	00	-		3	60			2		5	5.53
							4	80	-		5	40			1		е	5.03
							5	40	-		6	00			1		6	5.53

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600	-	660	2	7.54
780	-	840	2	8.54
840	-	900	1	9.05
900	-	960	1	9.55
1020	-	1080	1	10.05
1080	-		179	100.00

50 RUNS

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	START_	_TIME 0	END15	TIME 240	BLO 1	CKS 5	F	ACI	LITIE 2	S STO	RAGES 1	FRE	E_MEMO 8336	RY
LINE 48 50 52 60 62 64 66 68 70 80 80 84 90 100 110		LOC 1 2 3 ABC 5 COUNT: 7 8 9 COUNT: 11 12 13 14	1	BL G G U G U T I S I S I S I S I S I S I S I S I S I	OCK_T ENERA' ENERA' UEUE RANSFI EIZE EPART DVANCI ELEASI EIZE EPART DVANCI ELEASI ABULA'	YPE TE ER ER E E E E E E		El	NTRY_	COUNT 25 25 83 108 51 51 51 51 50 51 50 50 50 50	CUR	RENT_C	OUNT 0 0 0 5 0 0 1 1 1 1 0 0 0 0	RETRY 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
120 FACIL	ITY	15 ENTRIES	S UTI	ті С.	ERMINA	ATE TIN	1E AV	ATLA	ABLE	50 OWNER	PEND	INTER	0 RETRY	0 DELAY
COUN	TER1 TER2	51	L 1.0	00 00	29	98.8 98.8	32 32			50 48	0 0	0 0	55 55	0
QUEUE ROOM	18	MAX 27	CONT.	ENTI	RIES H 108	ENTF	RIES(0) <i>7</i> 3	AVE.C 15.	ONT. A 35	VE.TI 2165	ME AVI .56	E.(-0) 2227.4	RETRY 3 0
STORA ROOM	GE S	CAP.	REMA: 2	IN. 1 2	MIN. O	MAX	(, E) 0	NTRI	IES A O	VL. A' 1	VE.C. 0.00	UTIL. 0.00	RETRY 0 0	DELAY 0
TABLE TRNT	IME	M 644	1EAN 17.90		STD.DE 3546.9	EV. 94	RETR 0 24 54 60 84 90 102 108	Y F 0 - 0 0 - 0 0 - 0 0 - 0 0 - 0 0 - 0 0 - 0	\ANGE	300 600 660 900 960 1080		FREQUE 1 1 1 1 1 44	NCY C	UM.% 2.00 4.00 6.00 8.00 10.00 12.00 00.00
ROOM	180	609	98.02	3	3510.7	77	0 240 300 540 780 840 900	- 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0		0 120 300 360 600 660 840 900 960		3 2 1 2 1 2 1 1 1 87	1	2.97 4.95 5.94 7.92 8.91 10.89 11.88 12.87 13.86 00.00

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DRESSING ROOM

1. One Common Line

Program

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; GPSS/PC Program File RM5DRESSINGS.GPS. (V 2, # 38584) 10-29-2002
10:08:44
20 *******SCM, 02/07/02, TIME IN SECONDS***
22 ROOMS STORAGE
                      3
                                           ;3 COUNTERS AT ROOM 5
30 TRNTIME TABLE
                      M1,0,60,20
                                          ;TRANSIT TIME DISTRIBUTION
           QTABLEROOM5,0,60,20FUNCTIONRN1,C24
40 ROOM5Q QTABLE
                                           ; ROOM5 QUEUE TIME DISTRIBUTION
42 EXP
.0,.0/.1,.104/.2,.222/.3,.335/.4,.509/.5,.69/.6,.915/.7,1.2/.75,1.38/.8,1.6
.84,1.83/.88,2.12/.9,2.3/.92,2.52/.94,2.81/.95,2.99/.96,3.2/.97,3.5/.98,3.9
.99,4.6/.995,5.3/.998,6.2/.999,7.0/1.0,8.0
          FUNCTION
44 SERV
                     RN2,D4
                                           ;SERVICE TIME DISTRIBUTION
.20,240/.35,300/.76,360/1.00,420
46 DRE
           FUNCTION
                      RN3,D3
.4,1/.8,2/1.0,3
50
           GENERATE
                       2,FN$EXP
52
           ASSIGN
                       1, FN$DRE
60
                        ROOM5
           QUEUE
                                           ;ONE QUEUE FOR 3 COUNTERS
70
           SEIZE
                        P1
80
           DEPART
                        ROOM5
                                           ; DEPART ROOM5 QUEUE
90
           ADVANCE
                        FN$SERV
100
           RELEASE
                        Ρ1
                                           ; DISENGAGE COUNTER1
                                                                    110
           TABULATE
                        TRNTIME
120
           TERMINATÉ
                        1
                                                                      University of Moratuwa, Sri Lanka.
Output
                         Electronic Theses & Dissertations
                         www.lib.mrt.ac.lk
120 RUNS
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	START_TIME	END_TIME	BLOCKS	S FA	CILITIE	S STO	DRAGES	FREE	MEMOR	Y
	0	19330	9		3		1	1	3360	
LINE	LOC	BL	ОСК ТҮРЕ	2	ENTRY (COUNT	CURR	ENT CO	UNT	RETRY
50	1	GI	ENERATE			159		- ₀		0
52	2	A	SSIGN			159		0		0
60	3	Q	UEUE			159		16		0
70	4	SI	EIZE			143		1		0
80	5	DI	EPART			142		0		0
90	6	A	DVANCE			142		2		0
100	7	RI	ELEASE			140		0		0
110	8	Т	ABULATE			140		0		0
120	9	TI	ERMINATE	2		140		0		0
FACIL	ITY ENTRIE	S UTIL.	AVE. I	IME AV	AILABLE	OWNE	R PEND	INTER	RETRY	DELA
1	56	0.962	332.	14	1	130	0	0	0	10
2	53	0.898	327.	77	1	149	0	0	0	5
3	34	0.578	328.	79	1	157	0	0	0	1
QUEUE	MAX	CONT. ENT	CRIES EN	ITRIES (0) AVE.(CONT.	AVE.TI	ME AVI	E.(-0)	RETR
ROOM	5 21	17	159	26	9.7	73	1183.3	35 14	414.68	0
STORA	GE CAP	. REMAIN.	MIN. M	IAX. E	NTRIES A	AVL.	AVE.C.	UTIL.	RETRY	DELA
ROOM	S	3 3	0	0	0	1	0.00	0.000	0	0
TABLE	M	EAN S	STD.DEV.	RETRY	RANGE		FI	REQUEN	CY CUN	4.%
TRNT	IME 145	5.47 1	103.10	0				-		
TABLE	M	EAN S	STD.DEV.	RETRY	RANGE		FI	REQUEN	CY CUN	1.8
				180	-	240		5		3.57
				240	-	300		3	,	5.71

			300 -	360	10	12.86
			360 -	420	13	22.14
			420 -	480	6	26.43
			480 -	540	4	29.29
			540 -	600	3	31.43
			600 -	660	5	35.00
			660 -	720	5	38.57
			720 -	780	4	41.43
			780 -	840	1	42.14
			840 -	900	3	44.29
			900 -	960	3	46.43
			960 -	1020	2	47.86
			1020 -	1080	1	48.57
			1080 -		72	100.00
ROOM5Q	1116.39	1099.14	0			
			-	0	26	18.31
			0 -	60	4	21.13
			60 -	120	1	21.83
			120 -	180	7	26.76
			180 -	240	4	29.58
			240 -	300	6	33.80
			300 -	360	6	38.03
			360 -	420	5	41.55
			420 -	480	2	42.96
			540 -	600	3	45.07
			600 -	660	3	47.18
			660 -	720	1	47.89
			720 -	780	2	49.30
			780 -	840	1	50.00
			840 -	900	2	51.41
			900 -	960	1	52.11
			960 -	1020	2	53.52
		University of M	lor1020 Sri Lank	1080	2	54.93
		Electronic Thes	1080 -	5	64	100.00
	23	www.lib.mrt.ac	1050 -	1200	38	100.00

1. Three Separate Lines

Program

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; GPSS/PC Program File RM5INIQ.GPS. (V 2, # 38584) 11-07-2002 15:12:05 10 **********ROOM 5 -DRESSINGS************ 20 *******SCM, 02/07/02, TIME IN SECONDS*** 22 ROOMS STORAGE ;3 COUNTERS AT ROOM 5 3 30 TRNTIME TABLE M1,0,60,20 ;TRANSIT TIME DISTRIBUTION 40 ROOM5Q QTABLE ROOM5,0,60,20 ;ROOM5 QUEUE TIME DISTRIBUTION 42 ARRV FUNCTION RN1,D6 .46,50/.73,100/.87,150/.94,200/.98,250/1.00,300 FUNCTION RN2, D4 44 SERV ;SERVICE TIME DISTRIBUTION .20,240/.35,300/.76,360/1.00,420 ,,,25 48 GENERATE 50 TRANSFER , ABC 52 GENERATE FN\$ARRV 60 ABC QUEUE ROOM5 62 TRANSFER BOTH, COUNT1, COUNT2 64 COUNT1 SEIZE COUNTER1 66 DEPART ROOM5 70 ADVANCE FN\$SERV 80 COUNTER1 RELEASE 82 COUNT2 SEIZE COUNTER2 84 DEPART ROOM5 86 ADVANCE FN\$SERV RELEASE COUNTER2 88 90 COUNT3 SEIZE COUNTER3 92 DEPART ROOM5 96 ADVANCE FN\$SERV

100	RELEASE	COUNTER3
110	TABULATE	TRNTIME
120	TERMINATE	1

40 RUNS

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	START_TIME 0	2	END_TIME 13980	BLO 1	CKS 9	FAC	ILIT 3	IES	STC	RAGES	FREE	_MEMOI 1392	RY
LINE	LOC	2	BL	ОСК Т	YPE		ENTR	Y C	OUNT	CURF	ENT CO	UNT	RETRY
	1		G	ENERA	ΤE			-	25		_ 0		0
	2		Т	RANSF	ER				25		0		0
	3		G	ENERA	ΤĒ			1	36		0		0
	ABC	2	Ç	UEUE				1	61		0		0
	5		Г	RANSF	ER			53	52		115		0
	COU	JNT1	S	EIZE					43		0		0
	7		E	EPART					43		0		0
	8		A	DVANC	E				43		1		0
	9		R	ELEAS	E				42		3		0
	COU	INT2	S	EIZE					42		0		0
	11		D	EPART					42		0		0
	12		A	DVANC	E				42		1		0
	13		R	ELEAS	Ε				41		0		0
	COU	INT 3	S	EIZE					41		1		0
	15	•	D	EPART					40		0		0
	16	5	A	DVANC	E				40		0		0
	17		R	ELEAS	Ε				40		0		0
	18		Т	ABULA	ΤE				40		0		0
	19		Т	ÉRMIN.	ATE				40		0		0
FACI COUN COUN COUN	LITY ENT TER1 TER2 TER3	RIES 43 42 41	UTIL. 1.000 1.000 0.965	AVE 3 3	TI 25.1 32.8 29.2	ME AVA 2 6 7	ILAB 1 1 1	LE	OWNE 44 40 39	R PEND O O O	INTER 0 0 0	RETRY 115 115 0	Y DELAY O 3 O
OUEU	E M	AX	CONT. EN	TRIES	ENT	RIES(0) AV	E.C	ONT.	AVE.TI	ME AVI	E.(-0)	RETRY
ROO	м5	38	36	161		3	,	30.	34	2634	.72	2684.7	75 0
STOR ROOI	AGE MS	CAP.	REMAIN. 3 3	MIN. O	MA	X. EN O	TRIE	S A' 0	VL. 1	AVE.C. 0.00	UTIL. 0.000	RETRI O ((DELAY
TABLI TRN	E TIME	м 690	EAN 0.75	STD. 3890	DEV. .21	retry 0	RA	NGE			FREQUEI	NCY (CUM.%
						720	-		780		1		2.50
						960	-		1020		1		5.00
						1080	-				38	1	.00.00
ROOI	M5Q	639	8.08	3911	.18	0							
							-		0		3		2.40
						0	-		60		1		3.20
						300	-		360		2		4.80
						360	-		420		1		5.60
						660	-		720		1		6.40
						720	-		780		2		8.00
						900	-		960		1		8.80
						960	-		1020		1		9.60
						1020	-		1080		1		10.40
						1080	-				112	1	00.00

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ALTERNATIVES

ENTRY COUNTER - MORNING

Program

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; GPSS/PC Program File COUNTALTENT.GPS. (V 2, # 38584) 12-03-2002 12:40:34 10 ****ENTRY COUNTER IN THE MORNING**** 20 ****SCM, 02/07/02, TIME IN SECONDS**** 30 ARRV FUNCTION RN1,D10 ;TIME BETWEEN ARRIVALS DISTRIBUTIO .372,5/.632,15/.814,25/.901,35/.938,45/.971,55/.981,65/.989,75/.992,85/1.00,1 15 40 SERV FUNCTION RN2,D3 ;SERVICE TIME DISTRIBUTION .29,17.5/.90,22.5/1.00,27.5
 50 TRNTIME
 TABLE
 M1,0,150,25

 58 QTIM1
 QTABLE
 ENTRY1,0,60,25
 ;TRANSIT TIME DISTRIBUTION ENTRY2,0,60,25 60 QTIM2 OTABLE GENERATE ,,,35 TRANSFER .6,ABC,DEF GENERATE FN\$ARRV 62 64 66 68 TRANSFER BOTH, ABC, DEF 80 ABC ENTRY1 QUEUE 84 SEIZE ENTRY1 86 DEPART ENTRY1 88 FN\$SERV ADVANCE ENTRY1 90 RELEASE 92 DEF QUEUE ENTRY2 94 SEIZE ENTRY2 ADVANCE FNSSERV of Morning Stilliget THE SLIP RELEASE TABULATE TRNTIME TRNTIME 100 110 120 130 TRNTIME ; TABULATE DISTRIBUTION TERMINATE 140 ; ONE ENTERS 1

600 RUNS

START TIME	E END 1	IME BLOC	KS FAC	CILITIES	STORAGES	FRI	EE MEMO	ORY	
	0 -	12690	16	2		0	-	8368	
LINE	LOC	BLO	CK TYPE	ENT	RY COUNT	CUR	RENT CO	DUNT	RETRY
62	1	GE	NERATE		35		- (D	0
64	2	TR	ANSFER		35		()	0
66	3	GE	NERATE		639		()	0
68	4	TR	ANSFER		639		(0	0
80	ABC	QU	EUE		655		5	1	0
84	6	SE	IZE		604		()	0
86	7	DE	PART		604		()	0
88	8	AD'	VANCE		604		-	1	0
90	9	RE	LEASE		603		()	0
92	DEF	QUI	EUE		622		21	1	0
94	11	SE	IZE		601		1	L	0
100	12	DE	PART		600		()	0
110	13	AD	JANCE		600		()	0
120	14	RE	LEASE		600		()	0
130	15	TA	BULATE		600		()	0
140	16	TE	RMINATE		600		()	0
FACILITY	ENTRIES	UTIL.	AVE. TIME	AVAILAB	LE OWNER	PEND	INTER	RETRY	DELAY
ENTRY1	604	1.000	21.01	1	623	0	0	0	51
ENTRY2	601	1.000	21.11	1	601	0	0	0	21
QUEUE	MAX C	CONT. ENTR	IES ENTRI	ES(0) AVI	E.CONT. A	VE.TIN	1E AVE	E.(-0)	RETRY
ENTRY1	53	51	655	1 :	33.23	643.	. 87	644.85	5 0
ENTRY2	25	22	622	1 2	21.96	448.	.12	448.85	5 0

3.

TABLE	MEAN	STD.DEV.	RETRY	RANG	Ξ	FREQUENCY	CUM.%
	1125.57	292.01	0	-	150	7	1.17
			150	_	300	6	2.17
			300	-	450	7	3.33
			450	_	600	8	4.67
			600	-	750	8	6.00
			750	-	900	83	19.83
			900	-	1050	130	41.50
			1050	-	1200	52	50.17
			1200	_	1350	121	70.33
			1350	_	1500	163	97.50
			1500	-	1650	15	100.00
OTIM1	658.65	225.60	0				
~				-	0	1	0.17
			0	_	60	2	0.50
			60	-	120	3	0.99
			120	-	180	3	1.49
			180	-	240	2	1.82
			240	-	300	3	2.32
			300	-	360	19	5.46
			360	-	420	87	19.87
			420	_	480	84	33.77
			480	_	540	29	38.58
			540	-	600	24	42.55
			600	_	660	17	45.36
			660	-	720	40	51.99
			720		780	69	63.41
			780	-	840	24	67.38
			840	-	900	97	83.44
			900	-	960	69	94.87
			960	-	1020	30	99.83
			1020	_	1080	1	100.00
OTIM2	455.84	Unin 61 41	doratowa, S	Sri Lanka		-	100.00
£ · · · · ·		Electronic The	ses & Diss	ertations	0	1	0.17
	83	www.lib.mrt.ac	c.lk. 0	_	60	2	0.50
			60	_	120	3	1.00
			120	-	180	3	1.50
			180	-	240	2	1.83
			240	-	300	3	2.33
			300	_	360	3	2.83
			360	_	420	81	16.33
			420	-	480	235	55.50
			480	_	540	267	100.00

ROOM 2

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Issue equal patient numbers for two sessions 125 for morning and 125 for evening

Program

GPSS/PC Report file REPORT.GPS. (V 2, # 38584) 04-30-2003 14:14:59 page 1

START_TIME E		END_TIME	BLOCKS	FACILITIES	STORAGE	ES FREE_MEM	ORY
	0	19845	9	2	1	13632	
LINE	LOC	BLO	СК ТҮРЕ	ENTRY CO	UNT CU	JRRENT COUNT	RETRY
70	1	GE	NERATE	_15	1	- 0	0
72	2	AS	SIGN	15	1	0	0
80	3	QU	EUE	15	1	24	0
90	4	SE	IZE	12	7	1	0
100	5	DE	PART	12	6	0	0
110	6	AD	VANCE	12	6	1	0
120	7	RE	LEASE	12	5	0	0

130 140	8 9		TABULATE TERMINAT	E		125 125		()	0 0
FACILITY 1 2	ENTRIES 66 61	UTIL. 0.984 0.894	AVET 296 291	IME AVA .14 .15	ILABLE 1 1	OWNE 11 15	R PEND 2 0 0 0	INTER 0 0	RETRY I O O	DELAY 24 0
QUEUE STAFF	MAX C 26	ONT. EN 25	TRIES EN 151	TRIES(0 8) AVE.0 12	CONT. .43	AVE.TI 1634	ME AVE .21 1	E.(-0) H 1725.63	RETRY 0
STORAGE STAF	CAP. 2	REMAIN. 2	MIN. M. O	AX. EN O	TRIES A O	AVL. 1	AVE.C. 0.00	UTIL. 0.000	RETRY I) 0	DELAY 0
TABLE TRNTIME	ME. 1815	AN .24	STD.DEV 1509.61	. RETRY 0 150	RANGI -	E 300	:	FREQUEN 8		1.% 6 40
TABLE	ME	AN	STD. DEV	. RETRY 300 450 600 750 900 1050 1200 1350 1500 1650 1800 1950 2100 2400 2550 2700 3000 3150 3300 3450	RANGE	450 600 750 900 1050 1200 1350 1500 1650 1800 1950 2100 2250 2550 2700 2850 3150 3300 3450	J	FREQUEN 8 13 10 11 5 3 5 6 10 3 4 2 2 1 2 2 2 1 2 2 1 2 2 5	ICY CUN 12 23 31 40 44 46 50 55 63 65 68 70 72 74 76 77 78 80 100	1.% 2.80 3.20 1.20 3.20 1.20 3.20 1.20 3.20 1.00 5.40 3.20 <tr< td=""></tr<>
STAFFQ	1545.	.83	1535.60	0 150 300 450 600 750 900 1050		0 150 300 450 600 750 900 1050 1200		8 8 15 7 11 7 4 3 7	6 12 24 30 38 44 47 50 55	.35 .70 .60 .16 .89 .44 .62 .00
TABLE	ME <i>F</i>	AN	STD.DEV.	RETRY 1200 1350 1500 1650 1800 2100 2250 2400 2550 2850 3000 3150 3300 3450	RANGE	1350 1500 1650 1800 2250 2400 2550 2700 3000 3150 3300 3450	F	REQUEN 6 4 3 1 1 1 2 2 2 2 2 1 3 22	CY CUM 60 65 68 70 71 72 73 74 76 77 79 80 82 100	.32 .08 .25 .63 .43 .22 .60 .19 .78 .37 .16 .54 .00

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ROOM 15

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Issue 150 numbers per hour - Without initial queue

First hour 7.50-9.00

START	TIME	END_TIME	BLOCKS	FACILITIES	S STOP	RAGES	FREE MEMORY		
	0	4725	9	12		1	-		
FACILITY	ENTRIES	UTIL.	AVETIME	AVAILABLE	OWNER	PEND I	NTÉR	RETRY	DELAY
1	12	0.711	280.00	1	0	0	0	0	0
2	13	0.790	287.31	1	186	0	0	0	0
3	14	0.888	300.00	1	140	0	0	0	7
4	12	0.734	289.17	1	176	0	0	0	0
5	16	0.989	292.19	1	137	0	0	0	5
6	8	0.457	270.00	1	0	0	0	0	0
7	12	0.685	270.00	1	0	0	0	0	0
8	14	0.821	277.14	1	181	0	0	0	0
9	14	0.880	297.14	1	159	0	0	0	4
10	13	0.849	308.85	1	118	0	0	0	4
11	16	0.939	277.50	1	123	0	0	0	5
12	15	0.986	310.67	1	175	0	0	0	2
QUEUE	MAX (CONT. ENTE	RIES ENTRIE	CS(0) AVE.CC	NT. AV	'E.TIME	AVE	E.(-0)	RETRY
ROOM15	31	28	186	37 18.6	2	472.9	8	590.44	0

Second hour 9.00-10.00

STA	RT_TIME	END_TIN	1E BLOCKS	FACILITIES	S STOP	RAGES	FREI	E_MEMOI	۲Y
	0	4335	5 11	12		1		8912	
FACILITY	ENTRIES	UTIL.	AVE. TIME	AVAILABLE	OWNER	PEND	INTER	RETRY	DELAY
1	13	0.817	272.69	atuwa, SrilLanka,	169	0	0	0	4
2	12	0.779	Electron 281.67	& Dissertations	134	0	0	0	7
3	14	1.000	309.64	1	129	0	0	0	7
4	11	0.705	278.18	1	170	0	0	0	1
5	16	1.000	270.94	1	104	0	0	0	10
6	14	0.863	267.50	1	168	0	0	0	2
7	13	0.891	297.31	1	181	0	0	0	0
8	13	0.826	275.77	1	198	0	0	0	0
9	15	1.000	289.00	1	185	0	0	0	0
10	14	1.000	309.64	1	141	0	0	0	5
11	12	0.754	272.50	1	195	0	0	0	0
12	15	1.000	289.00	1	144	0	0	0	6
QUEUE	MAX (CONT. EN	TRIES ENTRI	ES(0) AVE.CO	DNT. AN	/E.TIM	E AVE	E.(-0)	RETRY
ROOM15	44	43	204	30 29.8	31	633.	50	742.73	3 0

Third hour 10.00-11.00

START	TIME	END_TIME	BLOCKS	FACILITIES	S STOP	RAGES	FREE	RY	
	0	4 140 11 12				1	8912		
FACILITY	ENTRIES	UTIL.	AVE. TIME	AVAILABLE	OWNER	PEND	INTER	RETRY	DELAY
1	13	1.000	318.46	1	146	0	0	0	3
2	15	1.000	276.00	1	168	0	0	0	4
3	15	1.000	276.00	1	144	0	0	0	5
4	14	0.952	281.79	1	195	0	0	0	1
5	16	1.000	258.75	1	162	0	0	0	1
6	10	0.683	283.00	1	175	0	0	0	1
7	13	0.898	286.15	1	0	0	0	0	0
8	13	0.925	294.62	1	171	0	0	0	1
9	14	1.000	295.71	1	185	0	0	0	0
10	9	0.626	288.33	1	188	0	0	0	2
11	14	1.000	295.71	1	96	0	0	0	13
12	15	1.000	276.00	1	151	0	0	0	7

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 QUEUE
 MAX
 CONT. ENTRIES ENTRIES(0)
 AVE.CONT. AVE.TIME
 AVE.(-0)
 RETRY

 ROOM15
 44
 40
 199
 20
 37.83
 787.09
 875.03
 0

Fourth hour 11.00-12.00

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	START	TIME	END_TIME	BLOCKS	FACILITIES	S STOP	RAGES	FREE MEMORY		
		0	4200	11	12		1 8448			
FACIL	ITY	ENTRIES	UTIL.	AVE. TIME	AVAILABLE	OWNER	PEND	INTER	RETRY	DELAY
1		12	0.845	295.83	1	172	0	0	0	5
2		12	0.865	302.92	1	133	0	0	0	6
3		17	1.000	247.06	1	151	0	0	0	5
4		11	0.786	300.45	1	168	0	0	0	2
5		15	1.000	280.00	1	103	0	0	0	11
6		13	0.871	281.54	1	164	0	0	0	3
7		13	0.886	286.54	1	187	0	0	0	0
8		14	0.864	259.29	1	204	0	0	0	0
9		15	1.000	280.00	1	0	0	0	0	0
10		13	1.000	323.08	1	96	0	0	0	6
11		12	0.867	303.75	1	201	0	0	0	0
12		14	1.000	300.00	1	142	0	0	0	5
QUEUE		MAX (CONT. ENTE	RIES ENTRIE	CS(0) AVE.CO	ONT. AV	E.TIM	e ave	2.(-0)	RETRY
ROOM	115	49	44	204	25 37.2	26	767.0	06	874.19	0

Fifth hour 12.00-1.00

FACILITY	ENTRIES	UTIL.	AVE.	TIME	AVAIL	ABLE	OWNER	PEND	INTER	RETRY	DELAY
1	11	0.765	3	00.45		1	163	0	0	0	6
2	13	0.834	2	76.92		1	142	0	0	0	3
3	15	1.000	2	87.67		1	122	0	0	0	7
4	12	0.736	2	65.00		1	178	0	0	0	1
5	15	1.000	2	87.67		1	105	0	0	0	11
6	13	0.819	Universi2	71.92	ntuwa, Sri	1Lanka	166	0	0	0	3
7	13	0.805	Electron2	67.31	& Dissert	ltions	189	0	0	0	0
8	13	0.889	www.lit2	95.38		1	0	0	0	0	0
9	15	0.991	2	85.33		1	193	0	0	0	0
10	15	1:000	2	87.67		1	132	0	0	0	3
11	12	0.874	3	14.58		1	180	0	0	0	0
12	14	1.000	31	08.21		1	144	0	0	0	5
QUEUE	MAX	CONT. EI	NTRIES I	ENTRIE	ES(0) 1	AVE.CC	NT. AV	/E.TIN	ie ave	C.(-0)	RETRY
ROOM15	42	41	200		29	34.2	8	739.	60	865.03	3 0
0	43	15 :	11	1	12		1		9264		

Sixth hour 1.00 - 2.00

START	TIME	END_TIME	BLOCKS	FACILITIES	S STOP	RAGES	FREE	RY	
	0	4140	11	12		1		8336	
FACILITY	ENTRIES	UTIL.	AVETIME	AVAILABLE	OWNER	PEND	INTER	RETRY	DELAY
1	13	1.000	318.46	1	145	0	0	0	4
2	15	1.000	276.00	1	167	0	0	0	4
3	14	1.000	295.71	1	143	0	0	0	5
4	14	0.966	285.71	1	194	0	0	0	2
5	16	1.000	258.75	1	161	0	0	0	2
6	9	0.665	306.11	1	169	0	0	0	3
7	14	0.952	281.79	1	200	0	0	0	2
8	14	0.913	270.00	1	0	0	0	0	0
9	15	1.000	276.00	1	201	0	0	0	1
10	10	0.654	271.00	1	190	0	0	0	2
11	14	1.000	295.71	1	95	0	0	0	13
12	13	1.000	318.46	1	134	0	0	0	10
QUEUE	MAX (CONT. ENTE	RIES ENTRIE	CS(0) AVE.CO	ONT. AV	E.TIM	ie ave	E.(-0)	RETRY
ROOM15	50	50	209	23 37.0)9	734.	69	825.54	1 0

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