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**ONLINE RECRUITMENT SYSTEM  
FOR  
FEDERAL PUBLIC SERVICE COMMISSION**



**DEVELOPED  
BY**

**GHULAM MURTAZA AWAN**

**&**

**MUHAMMAD AFZAL KHAN**

**Supervised  
By**

**MR. ANEES-UR-REHMAN**

**DEPARTMENT OF COMPUTER CENTRE  
QUAID-I-AZAM UNIVERSITY  
ISLAMABAD, PAKISTAN  
YEAR 2006**



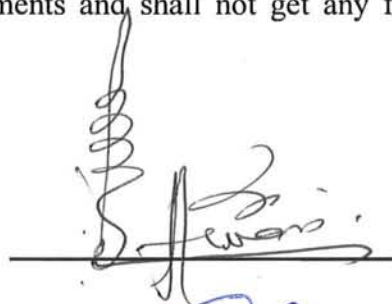
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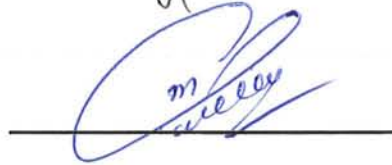
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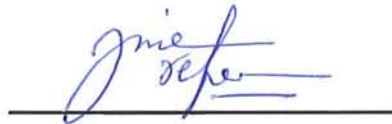
**GHULAM MURTAZA AWAN**

A handwritten signature in blue ink, appearing to read 'Ghulam Murtaza Awan', written over a horizontal line.

**MUHAMMAD AFZAL KHAN**

A handwritten signature in blue ink, appearing to read 'Muhammad Afzal Khan', written over a horizontal line.

**PROJECT SUPERVISOR**  
**Mr. Anees-ur-Rehman**

A handwritten signature in blue ink, appearing to read 'Anees-ur-Rehman', written over a horizontal line.

**DATE OF SUBMISSION:**

**22<sup>nd</sup> November, 2006**

## FINAL APPROVAL

This is to certify that we have read the project report submitted by the following students


**MR. GHULAM MURTAZA AWAN**

**MR. MUHAMMAD AFZAL KHAN**

It is our judgment that this report is of sufficient standard to warrant its expectance by Quaid-i-Azam University, Islamabad, for the Diploma of PGD-IT.

## EXAMINATION COMMITTEE

*Internal Supervisor*



**MR. ANEES-UR-REHMAN**

*External Supervisor*

---

## ACKNOWLEDGMENT

All praises for **ALLAH**, The Creator of the Universe, who guided mankind to path of understanding, knowledge, reasoning, and research through his beloved **Holy Prophet (PBUH)**. First of all we would like to extend our sincere and humble gratitude to Almighty Allah who endowed us potential and ability to make solid contribution to the already existing oceans of knowledge.

We would like to express our profound regards to our project supervisor **MR. ANEES-UR-REHMAN** who provided us his cooperation, guidance and valuable support during the all phases of the project. The purpose of this acknowledgement will not to serve if we don't mention here the cooperation, assistance and guidance extended by our respectable teachers whose suggestions and criticism enabled us to complete this project.

We should love to acknowledge the co-operation of the officers of FPSC, which made us understand the organization its functions, requirements and areas of improvement.

**GHULAM MURTAZA AWAN**  
**MUHAMMAD AFZAL KHAN**

## PROJECT IN BRIEF

<b>Project Title</b>	Online Recruitment System for F.P.S.C.
<b>Objective</b>	<ol style="list-style-type: none"><li>1. To develop a dynamic interactive and website</li><li>2. To develop user-friendly environment for the candidates as well as for the internal users.</li><li>3. To simplify the recruitment procedures.</li><li>4. To simplify and speedup the test procedures.</li><li>5. To minimize the time consumed in recruitment.</li><li>6. To step forward to adopt online automation against manual system.</li><li>7. To minimize the working hands and cost, on the recruitment process.</li></ol>
<b>Developed By</b>	Mr. Ghulam Murtaza Awan Mr. Muhammad Afzal Khan
<b>Supervised By</b>	Mr. Anees-ur-Rehman
<b>References</b>	<ol style="list-style-type: none"><li>1. Teach yourself MS Access 2002 in 21 days Author: Paul Cassel, Jon Price, Craig Eddy</li><li>2. MS Access 2002 Author: James T.Perry, Stephen Haag, Merrill Wells</li><li>3. Software Engineering, Principles &amp; Techniques Author: Klaus Pohl, Gunter Bockle, Frank Vander</li><li>4. Business Component – Based Software Engineering Author: John Eargle, Franck Barbier</li><li>5. Sams Teach Yourself ASP 2.0 in 24 hours Author: By Scott Mitchell</li></ol>
<b>Operating System</b>	Windows XP
<b>System Used</b>	Pentium IV

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# **1. Requirement Specifications**

**For**

**Recruitment System for  
Federal Public Service Commission**

## Introduction

### 1.1. Purpose.

This section explains the Requirement Specifications (RS) for the development of software applications for Online Recruitment System for Federal Public Service Commission (FPSC), Islamabad. The document consists of a listing of current Business Processes, existing Computerization, Gap Analysis and Business Requirements. This RS document is based on a preliminary system analysis.

This section consists of five parts:

1. Introduction to FPSC
2. Current Business Processes
3. Existing Computerization
4. Gap Analysis
5. Business Requirement

Current Business Processes explains the existing working and functionality of various wings of FPSC. The Existing Computerization gives an overview of the present automation at FPSC. Gap Analysis identifies the areas which are not covered by the Existing Computerization. The Business Requirements section highlights features of new automated system by eliminating existing problems and gaps which are present in the Current Business Process.

### 1.2. Introduction to FPSC

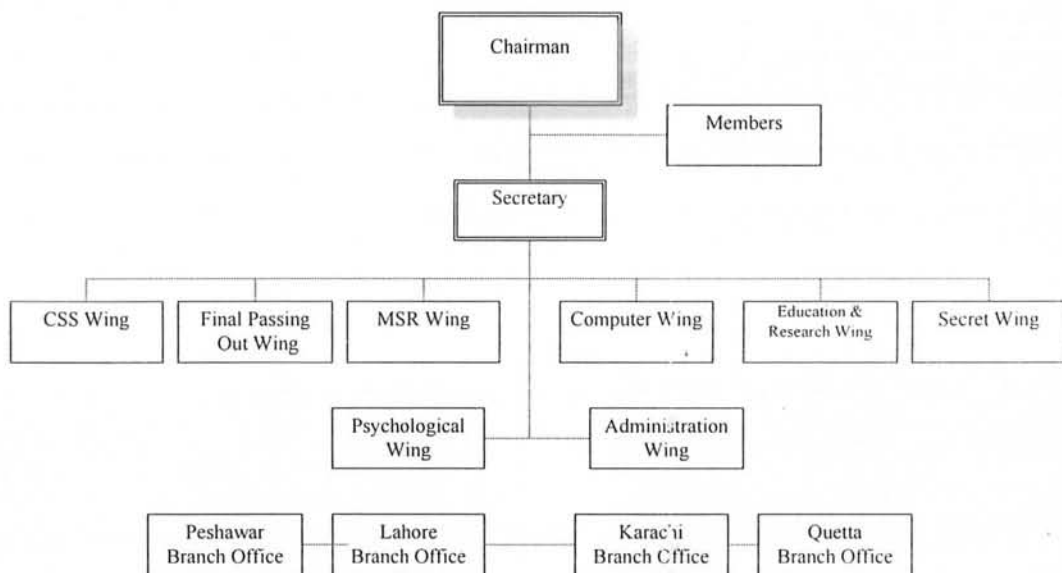
FPSC is an autonomous body and deals with the hiring of government employees. The Public Service Commission was set up for the first time in British India in 1926. After independence, the Commission was established in Pakistan in 1947 under the provision of Government of India Act, 1935. At present, the Commission is functioning under article 242 of the constitution of Islamic Republic of Pakistan. It was provided autonomy under the Rules of Business, 1973, and FPSC Regulations, 1978, in its working. The Commission has also been given administrative as well as, to some extent, financial autonomy to perform its functions independently.

The Commission consists of a chairman and eight members. The chairman is appointed by the president of the Islamic Republic of Pakistan. The members are appointed by the president on the advice of the Prime Minister of Pakistan. The Commission is assisted by the secretary who provides a link among the Commission, its secretariat, and various government agencies.

The FPSC has its headquarter in Islamabad and branch offices at four provincial headquarters i.e. Lahore, Karachi, Peshawar and Quetta. There are also six information centers situated in various universities of Pakistan and at selected Pakistani embassies in other countries.

### 1.3 FPSC Organization Chart

#### Federal Public Service Commission Organization Chart



### 1.3. Recruitment Wing

The basic functionalities of Recruitment Wing are to recruit through open competition in accordance with the policy of the Government for service, group. The functionalities of the Recruitment Wing are as follows:

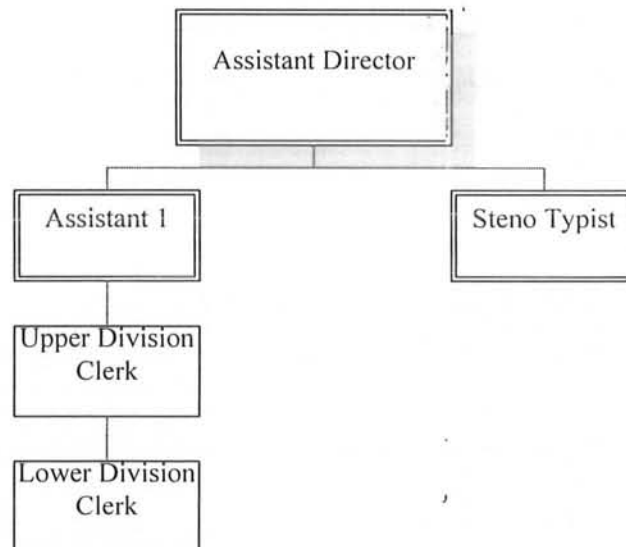
- Scrutinize the requisitions in the light of the recruitment rules and quota allocation of vacancies / posts.
- Announce the number of vacancies and invite applications through open advertisement.
- Issue instructions to the candidates relating the submission of applications and processing of recruitment against the advertised post(s).
- Analysis of qualification (all representations and review petitions received) and with the approval of the Commission, decide the eligibility of candidates as per advertised conditions in the terms of recruitment rules and related government instructions. Rejected candidates are required to be checked by going through the documents / proofs provided by the candidates. The final decision to restore or reject the candidate is made after holding personal hearing of the Commission.
- Hold tests and examinations, where necessary / mandatory.
- Call the departmental representatives from the sponsoring Ministries / Divisions / Departments not below the rank of Joint Secretary. Also call subject specialists in addition to the departmental representatives as and where required.
- Interview any number of candidates approved by the Commission, it considers most suitable for appointment, according to Recruitment Rules of the advertised post(s).
- Arrange finally qualified candidates in order of merit keeping in view allocation policy and recommend only one candidate against each vacancy as per prescribed regional / provisional quota.
- To issue nomination letters to the requisitioning Ministries / Divisions / Departments and also to the nominated candidate.
- To keep a record of the recruitment cases and issue nomination in case the principal nominee does not join within six months of the issue of the offer of appointment.

The Recruitment Wing is divided into two main wings which are further bifurcated into branches.

1. Pre Selection Wing
  - a. Recruitment-I (R-I)
  - b. Recruitment-II (R-II)
  - c. Recruitment Rules Branch
  
2. Finalization Wing
  - a. Recruitment-III (R-III)
  - b. Recruitment-IV (R-IV)
  - c. Recruitment-V (R-V)

**1.3.1. Recruitment Branch 1**

**Recruitment Branch-I Organization Chart**



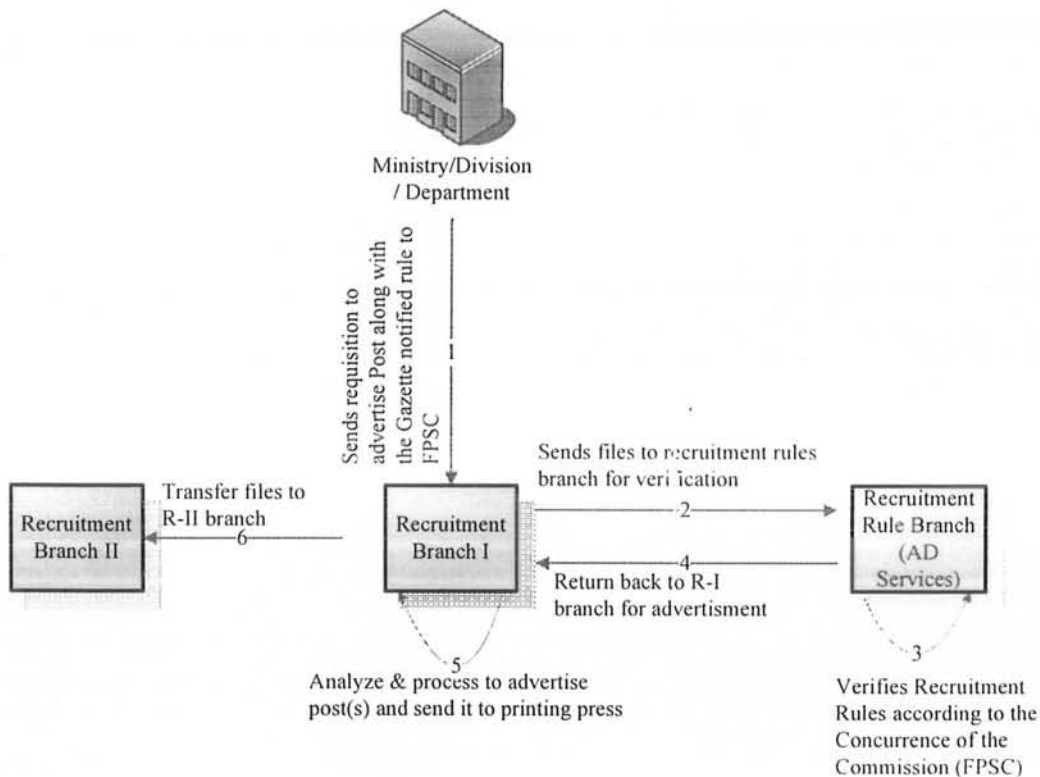
The functionalities of the Recruitment Branch I are as follow:

- To receive and analyze the requisition of posts (from BS 16 and above) submitted from Ministries / Divisions / Departments.
- To cater with requirements and examine the allccations of post(s) according to the procedure laid down for regional quota and the persons appointed so far.
- To get the recruitment rules verified from the Recruitment Rule Branch.
- To prepare draft advertisement and get it approved from the competent authority.

- To prepare a consolidated advertisement and get it published in the approved media, almost fortnightly.
- To deal with selection and competing media agencies through PID Department.
- To deal with irregular employees and other such assigned duties.

After release of advertisement all files are transferred to R-II branch with assigned file numbers.

## Recruitment Branch I Work Flow



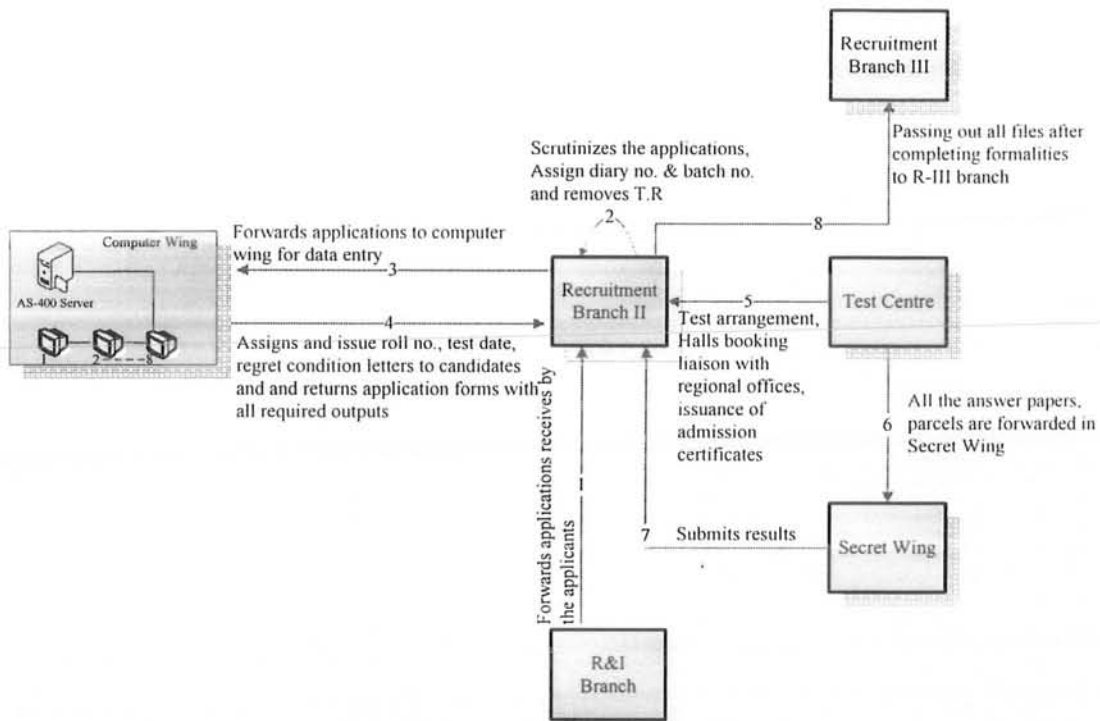
### 1.3.2. Recruitment Branch II

The applicants submit their application form along with relevant documents against the post advertised by the FPSC. Receive and Issue (R&I) branch forwards applications to the Recruitment Branch II. The budget section removes the Treasury Receipt T.R (application fee). If the applications received are less than two hundred the complete scrutiny is performed, where as if the applications received are more than two hundred, the initial scrutiny is performed. The initial scrutiny comprises of checking of unsigned applications, late submission of the applications and to check that all the applications are on the prescribed format. The R-II branch is further categorized into six branches to distribute the work load. The basic functionalities of all the six branches are same. The coordination work also comes under R-II branch which prepares and conducts the screening of tests / exams, replies candidate's queries, liaison with FPSC branch offices at

regional head quarters for booking of halls, security arrangements etc. The basic functionalities of the Recruitment Branch II are as follows:

- Assign diary number and batch number on Recruitment application forms.
- Scrutinize and cover up the applications, arrange for their enclosures, write name and other particulars of candidate on his file, and pass it on to the Computer Wing for processing on the computers. Documents are also arranged orderly.
- Receive output of cases from Computer Wing with applications and other documents. Put Roll numbers on the recruitment applications and arrange applications case wise, centre wise and roll number wise.
- From BS 16 to 18 Assistant Director analyzes the eligibility manually and Deputy Director checks it with the responsibility. Afterwards applications are sent to the Commission for its approval, usually comprising over two members.
- For BS 19, Deputy Director initiates pre selection / rejection and Director checks it with responsibility before submitting it to the Commission. Similarly, the BS-20 and above cases are initiated by Director, and Director General checks them.
- Prepare and submit the rejection / condition / regret letters to the candidates after approval of the Commission.
- Put all correspondence in relevant files.
- Prepare admission certificates for tests / examinations.
- Conduct tests / examinations at different cities.
- Check documents / test materials / attendance sheets / attendance lists received from the Computer wing before the commencement of tests and hand it over to the supervisors.
- After tests affix stamps showing absent / present candidates on the cover of applications.
- Arrange applications according to the merit after result are received from the Secret Wing.
- Transfer all files (cases) to R-III in Finalization wing.

## Recruitment Branch II Work Flow



The candidate can appeal to the Commission within the thirty days (30) of the issuance of the rejection letter. The file is submitted to the Commission and the Commission gives a verdict after conducting a hearing. If the candidate is not satisfied with the verdict he can appeal to the Review Petition Committee. The Committee comprises of two members of the FPSC and a Director / Deputy Director. The Review Petition Committee decision is final and cannot be challenged.

### 1.3.3. Recruitment Branch III

The Recruitment Branch III is a part of Finalization Wing. The test results and approved pre-selection cases are forwarded from R II Branch to the R III Branch.

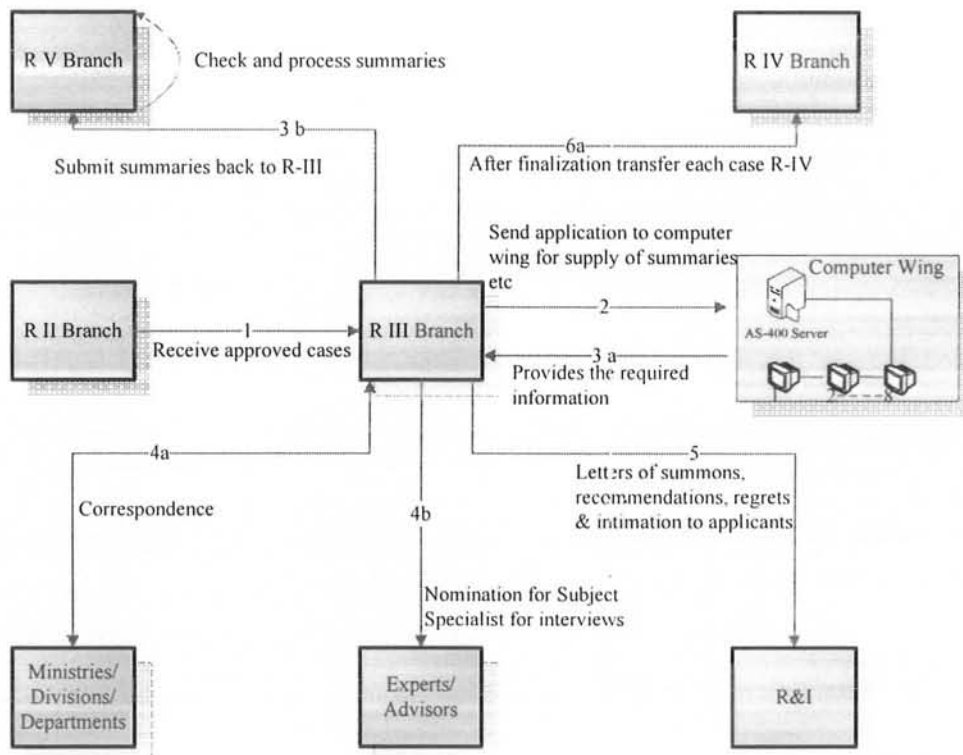
Following functionalities are performed by the R III Branch.

- The data regarding pre-selected candidates is passed on to the program seeking finalization for interview program.
- To deal with appeals and conduct personal hearing.
- To issue rejection memos in personal hearing and then process the review petitions if so required.
- To intimate program section for finalization of further programs and personal hearings.



- To provide summaries of pre-selected candidates to R-V for checking.
- To issue letters to ministries / divisions / departments for deputing their representatives for assisting the Commission at the time of interviews and to issue summon letters to pre-selected candidates as per list approved.
- To issue letters to experts and advisors as and when desired by the Commission for assistance.
- To compile merit wise results of qualified candidates after careful checking and to submit the same for approval of the Commission.
- To issue letters regarding recommendations to the ministries / divisions / departments.
- To issue intimation letters to candidates recommended by the Commission.
- To issue regret letter to the candidates obtaining low merit.

### Recruitment Branch III Work Flow



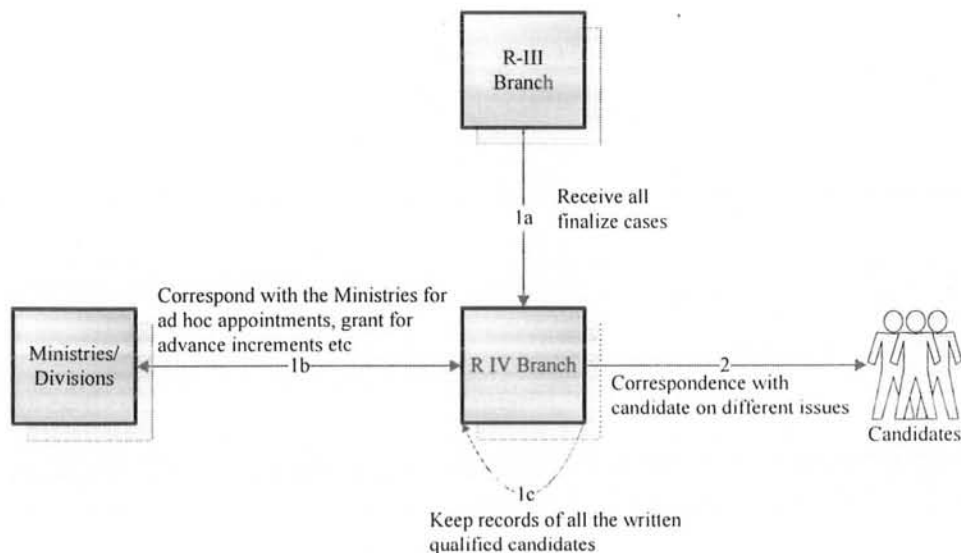
### 1.3.4.

### Recruitment Branch IV

Following functionalities are performed by the Recruitment Branch IV:

- To deal with all references from Ministries / Divisions / Departments regarding continuation of ad-hoc appointments and alternate nominations from reserve lists, in case the candidate recommended by the Commission does not join or accept the appointment.
- To deal with representations of candidates and other miscellaneous references after case is finalized.
- To issue monthly reminders to Ministries / Divisions / Departments to expedite offers of appointments to the Commissions nominees.
- To deal with all references from Ministries / Divisions / Departments regarding extension of contract appointments.
- Keeps record of all qualified candidates.
- Preparation of data for annual reports related to the Recruitment

### Recruitment Branch IV Work Flow



### 1.3.5.

### Recruitment Branch V

Following functionalities are performed by the Recruitment Branch V:

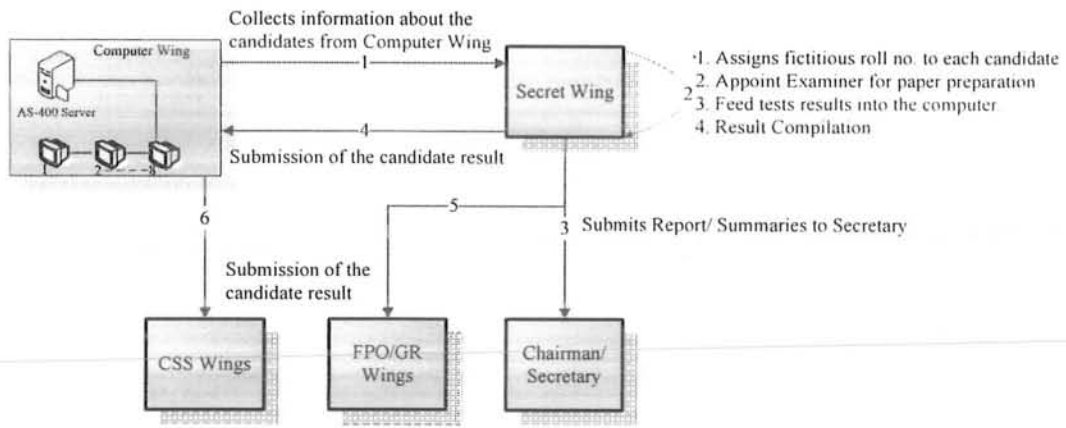
- To send applications to the Computer Wing for the supply of assessment form / summaries of pre-selected candidates for interviews.
- To check photographs of candidates affixed on the assessment form and indicate requirements from candidates.

## 1.4. Secret Wing

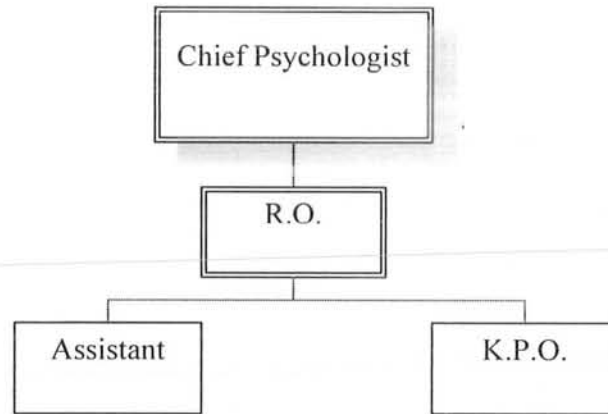
The Secret Wing deals with all secret matters related to examinations, test conducted by the Commission, maintains a panel of examiner and appoints the examiner with the approval of the Chairman. The Secret Wing is divided into two sections: one section is responsible for the CSS / FPO examinations and other deals with the Recruitment section also known as Screening Test (S.T). The following are the main responsibilities of the Secret Wing:

- Appointment of examiner for preparation of paper.
- The paper submitted by the examiner is in written form. It is the duty of the Secret Wing to type papers and take print outs.
- Assign fictitious roll number against every roll numbers issued by the Computer Wing.
- Result compilation of written tests of CSS / FPO examinations and screen tests for Recruitments.
- Result compilation of viva voce of CSS / FPO examinations.
- Creating a result statement allocating candidates to different occupational groups.
- Submission of the candidate result to the concerned wing.

## Work Flow for Secret Wing



## MCQ Cell Organization Chart

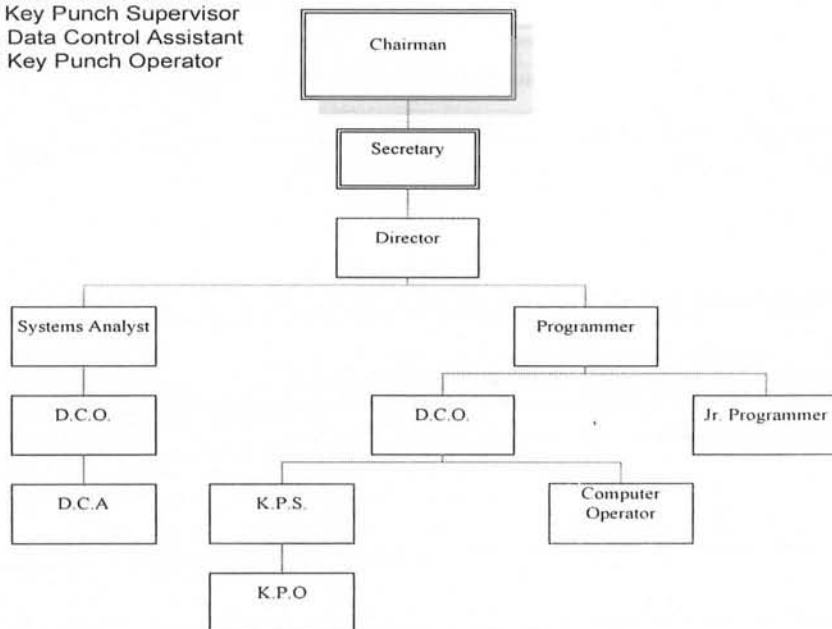


### 1.5. Computer Wing

The basic purpose of the Computer Wing is the computerization of the bio-data of any recruitment / examination conducted by the Commission.

#### Computer Wing Organization Chart

D.C.O.: Data Control Officer  
K.P.S.: Key Punch Supervisor  
D.C.A.: Data Control Assistant  
K.P.O.: Key Punch Operator



Computer wing also deals with all matters related to computerization in the Commission. The wing maintains the stock and proper record of the computerization stationary, magnetic tapes, discs (data modules). The Computer Wing gives output to the following Wings:

1. Competitive Examinations
2. Direct Recruitment
3. Final Passing Out Examinations

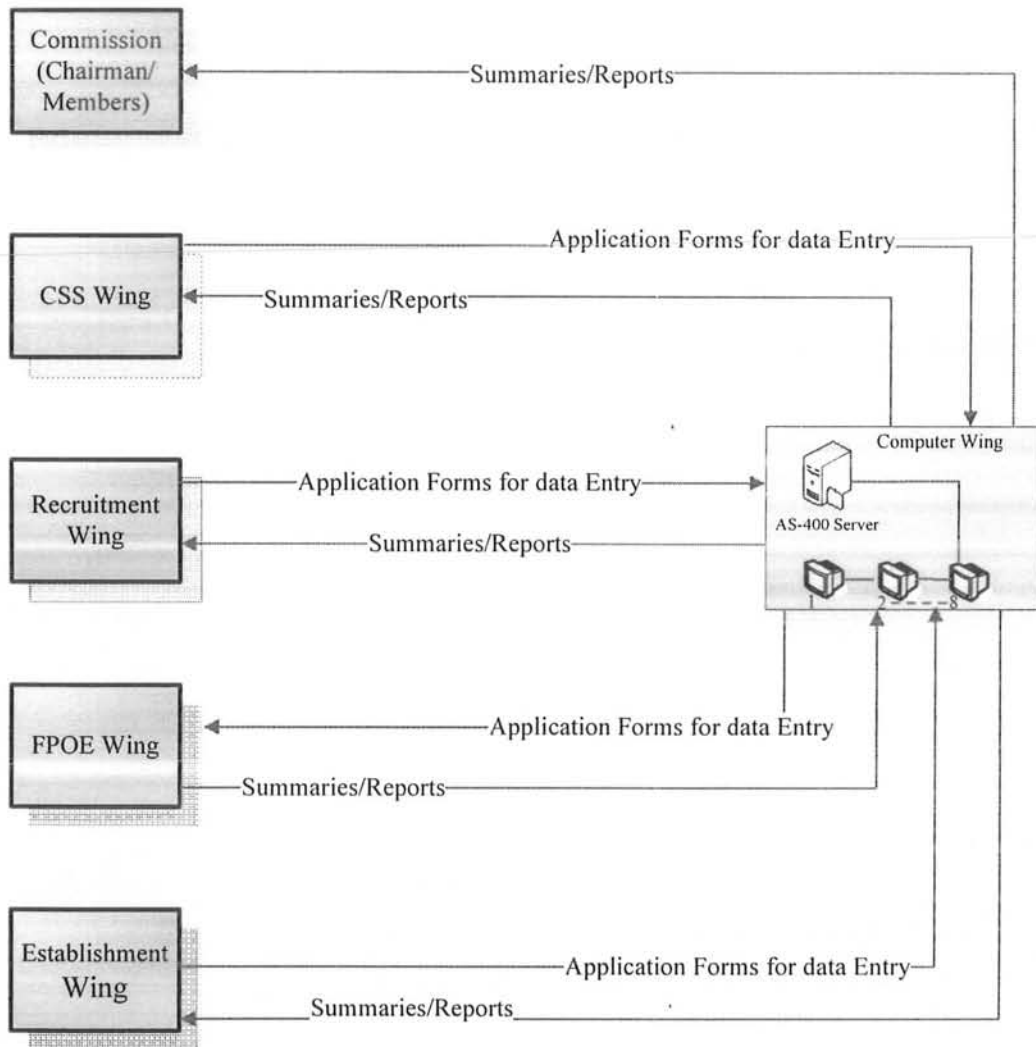
The main functionalities provided by the Computer Wing are as follows:

- To conduct periodic review of the computerization and suggest modifications and improvements in the system as and when required. These modifications are first discussed with the concerned officers in the Computer Wing (Programmer and Systems Analyst) and the Commission.
- To develop new computer program whenever required in association with the concerned Programmers and Systems Analysts of the Computer Wing.
- Conduct computer trainings and orientation courses.
- Provide assistance to other wings and higher authorities on computerization.

The output provided by the Computer Wing for the different wings are as follows:

- Generate different types of reports for the concerned Wings and higher authorities of FPSC as per requirement. For example no. of candidates appeared in competitive examinations along with their particulars (Name, Roll No., ID card, qualifications, experience, family particulars) etc.
- Applications received from CSS wing are scrutinized and then punched. The punched copy is verified with the documents by the Data Controlling Assistant (DCA) cell.
- Data entry of Recruitment and FPOE applications is done in the Computer Wing.
- Applications received by the Establishment Branch on a plain paper for Commission's internal recruitment are also entered into the computer in Computer Wing.
- Allocate roll numbers and centers to the candidates for different examinations (Competitive Examinations, Recruitment, FPOE and S.O. etc).
- Issue admission certificates (call letters) to candidates for different examinations (Competitive Examinations, Recruitment, FPOE and S.O etc).

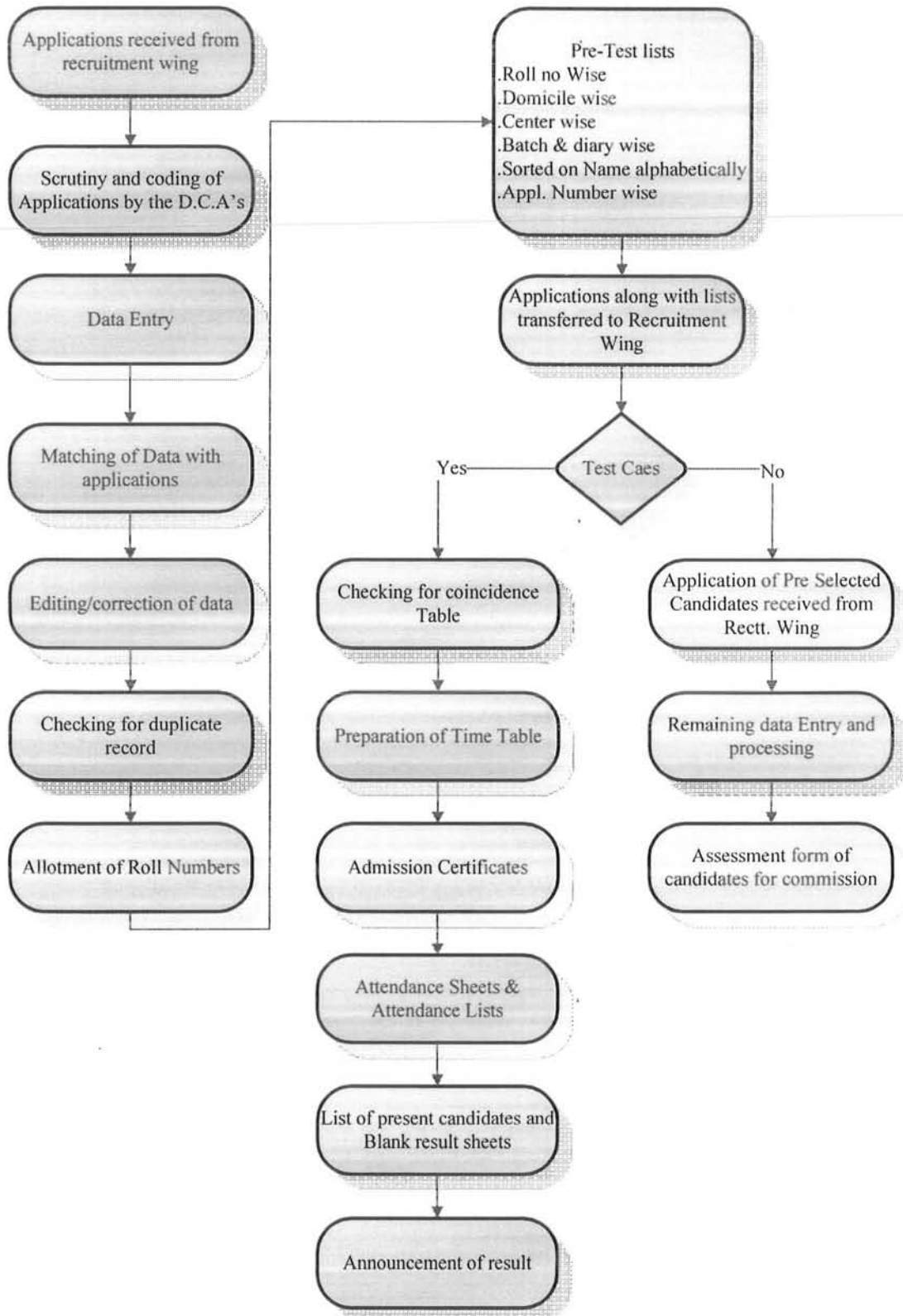
# Work Flow for Computer Wing



CSS Central Superior Services  
FPOE Final Passing Out Examinations

1.5.1.  
Computer Wing

Work Flow of Automated Recruitment System at





## 2. Existing Computerization

### 2.1. Computer Wing

The Computer Wing of FPSC was established in 1982. In 1988 IBM S-36 computers were introduced at FPSC. In 1997, these IBM S-36 computers were replaced with IBM AS 400 server. This was one of the main systems for that time. The specification of the AS 400 server machine is:

Sr. No.	Description	Capacity
1.	Model	600E
2.	Processor	22.7 CPW (Multiprocessor)
3.	Main Storage	64MB
4.	DASD	4.19x2 GB
5.	Tape Attachment	¼ Cartridge 2.5 GB
6.	Workstation at Attachment	7 Twinaxle
7.	LAN	Ports -3
8.	PCI	LAN adapter 01
9.	CD ROM	8x01

The eight (8) dumb terminals and two (2) dot matrix printers (IBM 4232, Printronix) are attached with IBM AS 400 sever. Software was developed in COBOL language for the AS 400 server machine. There are twenty one (21) key punch / computer operators for the purpose of data entry and twelve (12) data control officers (DCO's) are performing data check of the data entered. Following programs are running on AS/400 server in the Computer Wing for data entry and for application authenticity checking for the following Wings:

1. Central Superior Services (CSS) Examination System
2. Recruitment (GR) System
3. Final Passing Out (FPO) System

### 2.2. Recruitment System

The Recruitment system is used for the data entry of recruitment applications which are received against different recruitment advertisements. Initially the post which is advertised is entered in the Recruitment System. The information about post is: advertisement No., date of advertisement, closing date to submit the applications, total No. of cases, case No., concerned Ministry / Divisior. / Department, post name, grade, special pay, high start possible, status of the post (permanent or contract), sex, region, total No. of posts, maximum age, minimum age, degree, subject names, and foreign degree and experience.

Number of applications received at FPSC against an advertisement; depends on the interest of people for the particular post. Sometimes received applications are limited and sometimes in thousands.

Complete data entries are made for the applications which contains following information:

- Basic information of applicants; application No., batch No., diary No., receipt date, treasure receipt, advertisement no, case No., name, district of domicile, domicile self, sex, marital status, religion, center and age relaxation.
- Addresses information i.e. address, phone and fax No..
- Qualification information i.e. examination, date, division, board / university and three subject names.
- Course / training information i.e. name of course, institute & location, grade / division, from date, to date and No. of weeks.
- Employment information i.e. name of the post, Division / Department, from date, to date, status of his/her job whether federal govt. or provisional govt. etc and nature of job.
- Research and publication information i.e. title, publisher, date of publication.
- Miscellaneous information i.e. father's name, husband's name, nationality of the spouse.
- Check list information i.e. treasure receipt Rs. 500, national identity card, matric certificate, domicile / certificates of candidate, district certificate, three photographs, departmental permission certificate from present employer, education certificates, experience certificate and whether or not the application has been signed.

There is no proper computer setup installed at Recruitment Wing. At present all the data entry, reports, summaries, letters etc of Recruitment System are prepared in the Computer Wing.

### **2.3. Secret Wing**

At Secret Wing two P-IV computers are installed. One P-IV system is attached with the Optical Marks Recognizer (OMR) scanner to automatically read Multiple Choice Questions (MCQ) answer sheets and compile results. The other P-IV computer is used for result compilation of written examination papers. Result compilation software is developed in Dbase-III running on Windows 98.

### **3. Gap Analysis of Existing Computerized System**

- At present the existing computerization for different Wings of FPSC is command based and requires a time for data entry for example every time the data entry operator has to type the basic data for Province, Universities etc.
- The system must have the ability that each wing can perform their tasks separately by signing with their authorized user id / password e.g. the computer wing can enter the application data, the secret wing can enter the written result data, the Recruitment wing can enter the interview result etc.

#### **3.1. Gap Analysis of Recruitment System (RS)**

- At present complete data for each applicant entered, later on screening test is held and top candidate at the ratio 1:3 are selected for interview. Thus full data entry for all the applicants is wastage of the time and resources.
- At present unsigned applications are rejected. When the online system will be developed and implemented the applicants received online will be unsigned. Present criteria for this check will be changed so that unsigned online application process will be initiated, as this practice will reduce the time it takes to finalize an application.
- Often a candidate meets the criteria of more than one vacancy in a single advertisement; therefore, he is advised to apply for each post separately. FPSC does have a system to conduct a single test from the candidate against those vacancies but the existing system cannot identify the common candidates in different cases.
- The current system does not have adequate support to scrutinize the applications automatically. No computer check is available to check late received applications, unsigned applications, overage and other causes to process the pre-selected as well as rejected candidates.
- No check is available to match current information of the candidate with the previous record when candidate applies again at FPSC.

#### **3.2. Gap Analysis of Secret Wing**

- Result compilation software is developed in dbase III which is not a secure database. Any one having access to the computer can have access to the database.
- Software is providing fix number of reports which is not sophisticated to fulfill all the reporting need of the Secret Wing.

- The screening test conducted for Recruitment is paper based. OMR scanner is used for checking the answer sheets of MSQ tests. OMR software generates text file and this text file gets dumped into the dbase III database.
  - There is a requirement for storing candidate's picture but dbase III does not support this feature.
  - MCQ papers are not prepared automatically.
  - No database is maintained for Examiner's information.
- 
- Result compilation Recruitment tests/examinations is not fully automatic.

## **4. Business Requirements**

### **4.1. General Requirements**

- Ability to create, edit and view different user groups. A user group is assigned privileges of reading, writing application resources, e.g. user management screen, property information entry screen etc.
- Ability to create a new system user in an already created group and then to edit and view the user information.
- Ability to provide login and logout facility to multiple concurrent users (this will be a multi user application).
- Ability to authenticate and provide confined view to the user as per permitted privileges.
- Software should support both old and new NIC number formats
- Software should have support to accept historical data.
- The proposed system shall include full TCP/IP support and capability, including and SMTP.
- The software developer will use the process oriented approach as the basis for project planning. This approach lays out the importance of particular activities to be carried out to ensure the quality of the automated system.
- Must be built on a multi-tiered, distributed architecture. Must incorporate the latest in technological advances including use case methodology, event-driven programming design, and transaction-based processing.
- The system should be easy to use for first-time, novice, or infrequent users.
- The system shall be available via local area networks as well as from the internet.
- The system should provide prompts to available commands or actions on every screen.
- Instructions for receiving help and for quitting from the system should appear on every screen.
- The application to be developed must be compatible with the operating hardware and software for this purpose.

#### 4.1.1.

#### **Performance Criteria**

- Background processes, reporting, data loading, data integrity checking, data backup operations etc should not take a toll on the performance of the system.
- System should perform optimally during normal and peak work loads.
- The system must be designed for less than 1% downtime in normal load.

#### 4.1.2.

#### **Operations, Backup and Recovery**

- Mechanisms and techniques must be devised for guard against unintentional loss of data.
- When necessary, full data recovery must be made possible
- The system should have an emergency / contingency module that captures any data input during a period of possible LAN failure and which permits the upload of such data to the central database once the LAN becomes operational.

#### 4.1.3.

#### **System Monitoring and Logging**

- For the purpose of trouble shooting and performance analysis, authorized members activity logging mechanism must be incorporated in the system.
- The system must be able to identify and reveal which individual has modified, added or deleted any data within any part of the system. This feature generates a comprehensive log of all actions undertaken by various users. This trail ensures all information in the system is secure and can be used for accountability and proper monitoring of the system.

#### 4.1.4.

#### **User Rights and Security Management**

- The module will control all the authorized users with their assigned rights and only authorized users can login to the software and can perform the tasks which administrator of the software has allowed from menu-level up to the button-level (add, edit, delete, print, post and view etc.)
- Access level of each user can be defined at the time of creating the user.
- Access level of each module / interface can be defined at the time of creation of the user.

#### 4.1.5.

#### **Confidentiality**

- The Online Recruitment System for FPSC should be kept extremely confidential.
- Users of one particular wing should not be able to view / access the information of any other wing until and unless that information is made public.

## 4.2. System Features Recruitment System

- System must have the ability to accept applications submitted online as well as received through any other source. All data will be entered online by the candidate himself and after application is submitted, system will generate unique application code and password for each applicant for future reference. The data will be saved automatically and the system itself will provide the previous data whenever a candidate applies again. This way the applicant won't be able to cheat with FPSC or not hide any qualification or experience he has already informed previously.
- The application data should be into two parts i.e. partial data and full data. Only partial data should be entered from each applications. Full data should be entered for only those applicants who are to be called for interview.
- If the applicant applies for more than one post at a time then system should have the ability to accept multiple case numbers against single candidate's record and generate multiple application numbers because candidate has to pay the fee for each post separately, and would be considered a candidate for each post.
- System must have ability to enter, update and delete information about different jobs, job title, basic pay scale, minimum qualification, age, experience, number of posts, department name, date, reference letter number, and advertisement case number etc to locate the previous references and advertisements if any.
- The system must have the ability to enter, update, and delete data about the seats allocated, vacant seats in different ministries / divisions / departments.
- The system must have to cater and define test cases, prepare tentative time table and provide all requirements and outputs to conduct tests (screening tests / examinations) in Recruitment cases.
- The system must have the ability to enter, update and delete partial information / test case information as well as detail information. i.e. the applicant's details includes (name, father's name, spouse/husband name, date of birth, age, national identity card, sex, address(current and permanent), district, domicile, email address, phone no, academic qualification, etc.).
- System must have ability to accept fee information, raise flag on wrong information, and to asses the eligibility according to advertised recruitment rules.
- The system must have the ability to enter, update and delete data about the batch number and diary number.
- The system must have ability to enter check list information from the application.
- The system must have the ability to scan and impose candidate's picture on the admission certificate and to other letters where required.

- The system must have the ability to club the information of the candidate applying for different posts so one exam should be conducted for a candidate, the information should be clubbed using the NIC No..

#### **4.3. System Features M.C.Q. System.**

- MCQ system must have the ability to retrieve questions from the database. For preparation of MCQ question paper through selecting questions intelligently and randomly from the database
- Ability to intelligently generate question paper for online exam from the question database and eliminating similar natured questions and should also provide facility to edit the question paper.
- MCQ system must have the ability to add, update and delete.
- MCQ system must have the ability to add, update and delete mathematical formulas.
- MCQ system must have the ability to enter, update and delete graphs and diagrams.
- System must have ability to conduct Computer Based Testing (CBT) on LAN at FPSC building Islamabad and show results to the candidate immediately.

#### **4.4 Reports**

The System must be equipped with dynamic report engine so the user can easily change report's fields to incorporate new changes if required. Following are the minimum reports required initially by the various wings of FPSC.

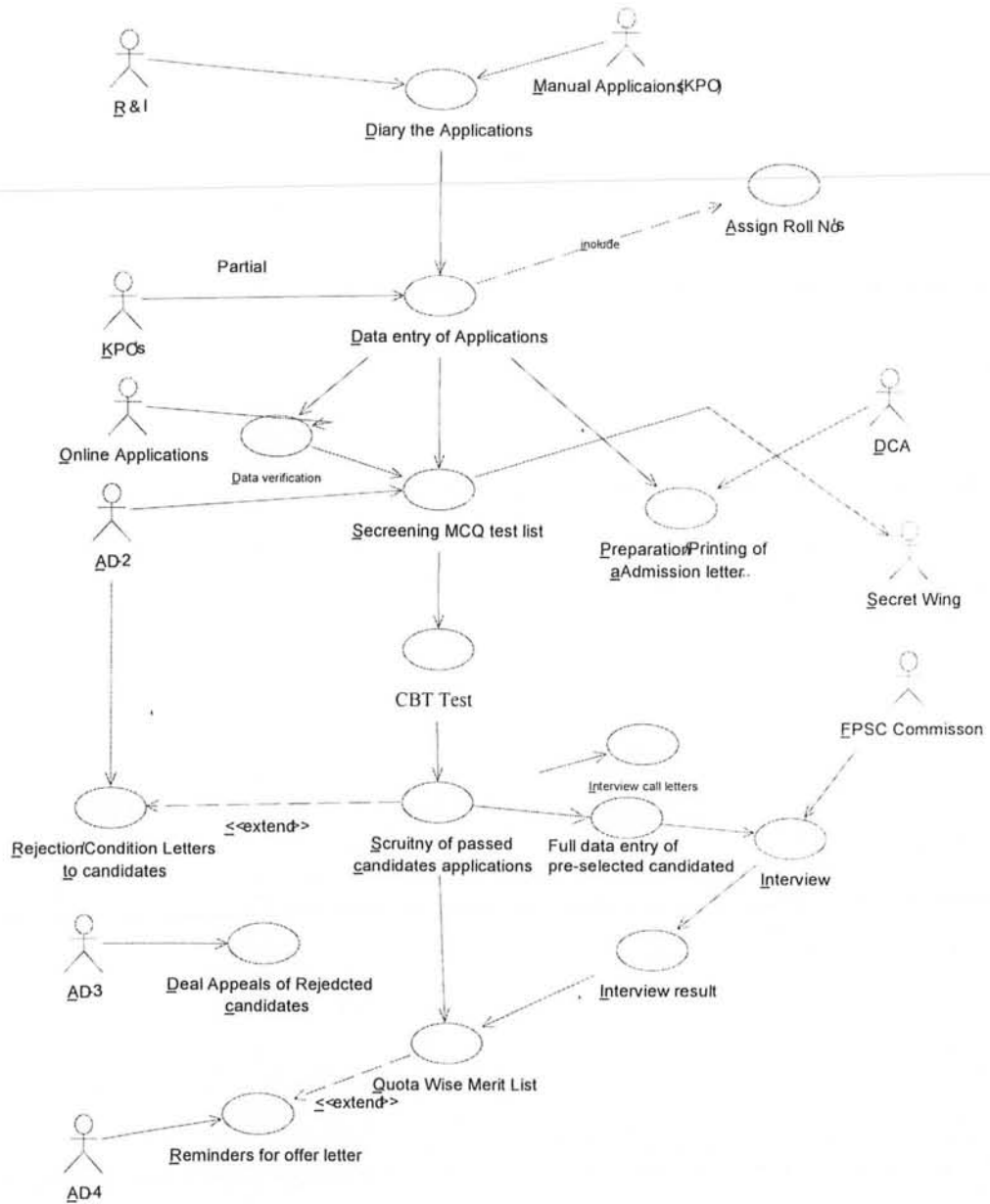
- Concise list of candidate's batch and diary number wise list.
- List of duplicate by date of birth.
- List of duplicate by NIC No.
- List of duplicate by name.
- List of duplicate by application no.
- List of the number of examination centers.
- List of number of candidates at each examination center.
- List of eligible candidates.
- Summary bio-data of candidates with imposed of scan picture.
- List of candidates sorted by roll no.
- Domicile wise list of candidates.
- Coincidence table of candidates.
- Case wise list of examination scheduled.
- Center wise schedule for conduct of exam.
- Center wise attendance list.
- Merit list of candidates for press note.
- University wise list of candidates.
- Province / district wise list of candidates.
- Sex wise list of candidates.
- Print call/rejection/regret letters.



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## **5. Functions Specification**

## 5. Recruitment System



## 5.1 Recruitment System

**Use Case Name:** Recruitment System

**Brief Description:** This use case describes the process of recruitment as per gazetted notification.

**Actors:** Recruitment wing, Secret wing, Computer wing, KPO's, Online Applicants

**Pre-Condition:** There must be recruitment requirement and gazetted notification for the post.

**Post Condition:** Hiring of candidates as per merit and gazetted notification rules.

**Primary Flow:**

1. Diary the applications (UC- 01)
2. Data entry of applications (UC- 02)
3. Online applicants (UC-03)
4. Data verification and duplicate checking. (UC-04)
5. Assign roll numbers (UC-05)
6. Preparation/Printing of admission/attendance letters (UC-06)
7. Screening test list (UC-07)
8. Conduct MCQ/test. (UC-08)
9. Scrutiny of the passed candidates applications (UC-10)
10. Requirements / Rejection letters to candidates (UC-11)
11. Full data entry. (UC-12)
12. Interview call letters (UC-13)
13. Quota wise merit List (waiting list). (UC-14)
14. Summons/ recommendation letters to successful candidates/Departments (UC-15)

### 5.1.1.

#### UC-01: Diary the Applications

**Use Case Name:** Diary the Applications.

**Purpose:** Diary of applications who have applied for the recruitment post through mail, fax.

**Actors:** KPO's

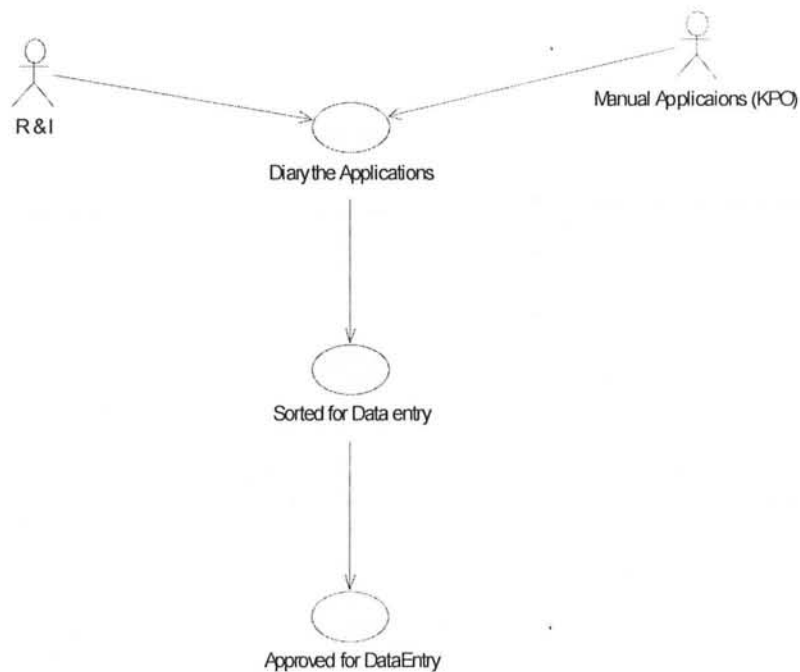
**Use Case Model:** Recruitment System

**Pre-Condition:** Filled Application forms

**Post Condition:** System will store the applicant's information for the recruitment post

Actors Action	System Response
1. Key Punch Operators (KPO's) will enter the applicant's filled application forms.	1. System will add the information. 2. System will update the data (in case the information needs to be updated)

#### Diary the Applications



### 5.1.2.

## UC-02: Data Entry of Applications

**Use Case Name:** Data Entry of Applications.

**Purpose:** Data entry of applications of applicants who have applied for the recruitment post through mail, fax.

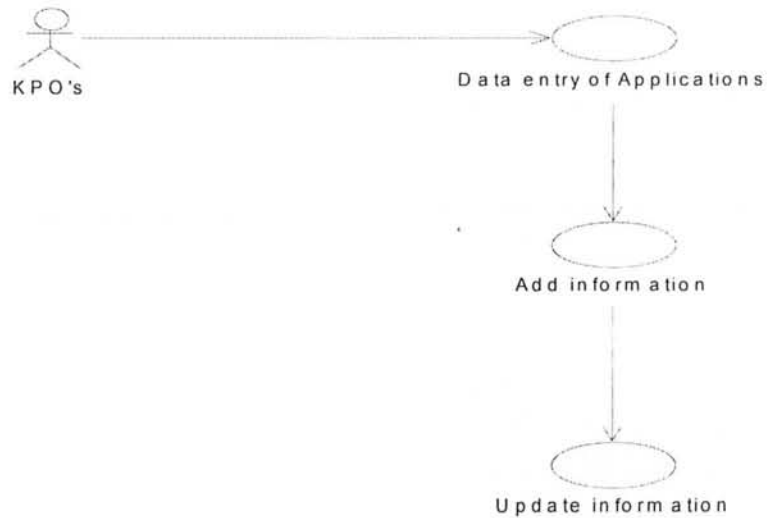
**Actors:** KPO's

**Pre-Condition:** Filled application forms are received from R&I branch.

**Post Condition:** System will store the applicant's information for the recruitment post

Actors Action	System Response
1. Key Punch Operators (KPO's) will enter the applicant's filled application forms.	1. System will add the information. 2. System will update the data (in case the information needs to be updated)

### Data Entry of Applications



### 5.1.3.

### UC-03: Online Applicant Data Entry

**Use Case Name:** Online Applicant Data Entry.

**Purpose:** Data entry of online applicants for recruitment post.

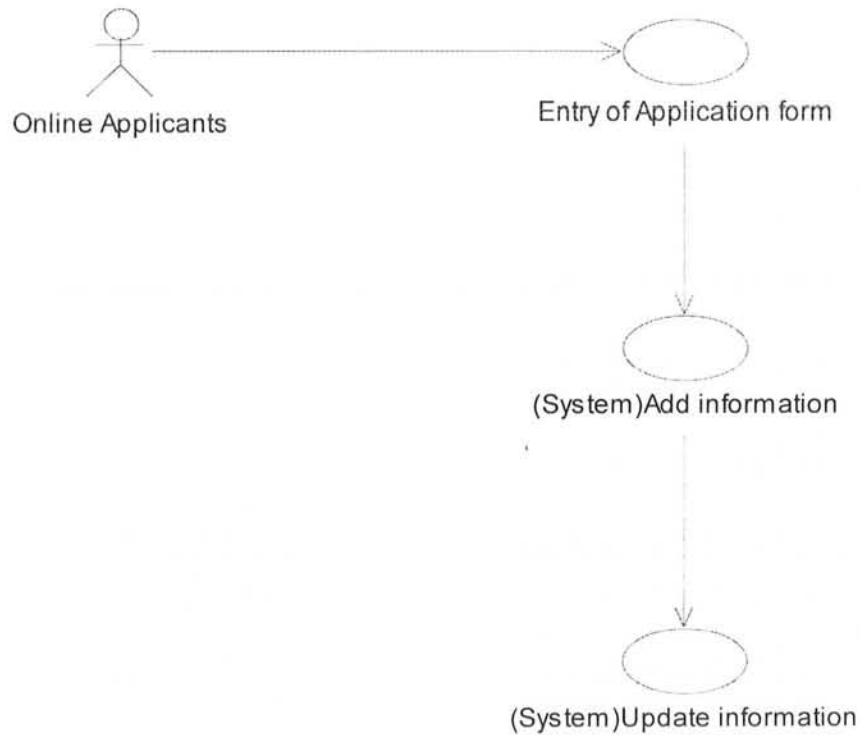
**Actors:** Online Applicants

**Pre-Condition:** There must be web interface for online applicants

**Post Condition:** System will store the applicant's information for Rectt exam

Actors Action	System Response
1. Online applicants will enter his/her data for the recruitment post.	1. System will add the information. 2. System will update the data (in case the applicants wants to update his/her information)

#### Online Applicant Data Entry



5.1.4.

#### UC-04: Data verification and duplicate checking

**Use Case Name:** Data verification and Duplicate Checking.

**Brief Description:** Verification of data entered in the system is verified through hard copy applications.

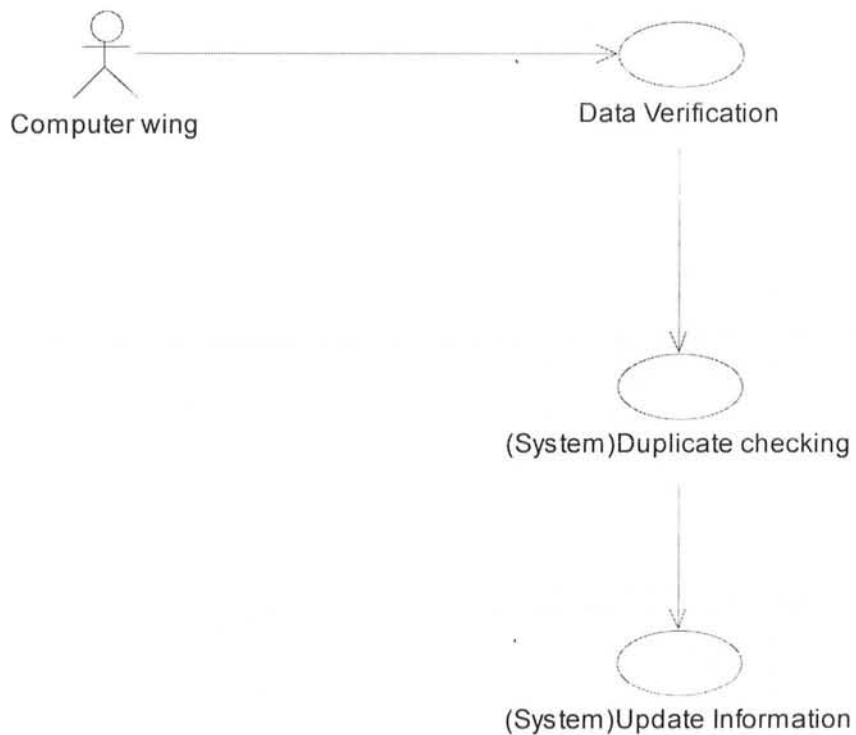
**Actors:** Computer Wing

**Pre-Condition:** Data entry of applications is in the system.

**Post Condition:** Assignment of Roll No's.

Actors Action	System Response
1. DCA'S verify the data entered in the system.	1. Verified applications are available for further processing.

#### Data verification and duplicate checking



### 5.1.5.

#### UC-05: Assign Roll Numbers

**Use Case Name:** Assign roll numbers.

**Purpose:** Assign roll numbers to candidates.

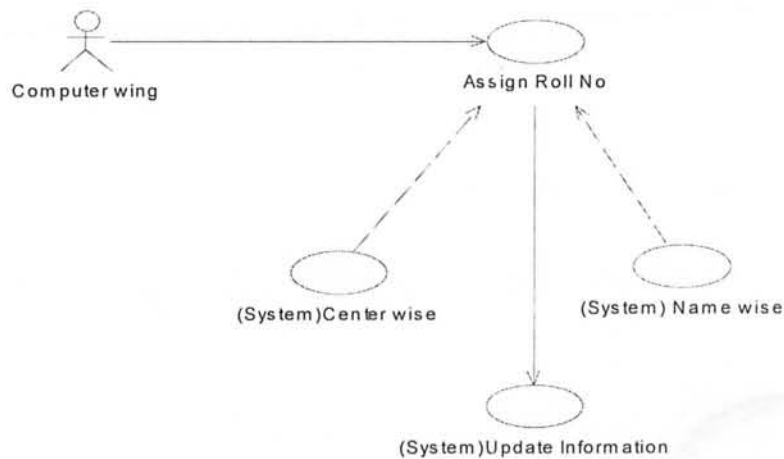
**Actors:** Users, System

**Pre-Condition:** The data of candidates is entered and verified and duplicates removed.

**Post Condition:** Center info and timetable detail.

Actors Action	System Response
1. Unique roll no's list entered in the system for assigning of Roll Numbers to candidates applications.	1. Issue rolls number according to center wise and candidate names. 2. System will update the candidate's data with his/her roll number for the Recruitment test.

#### Assign Roll Numbers





5.1.6.

**UC-06: Preparation of admission letters**

**Use Case Name:** Preparation of admission letters for test

**Purpose:** Admission letters are prepared to issue to the candidate to appear for the screening test.

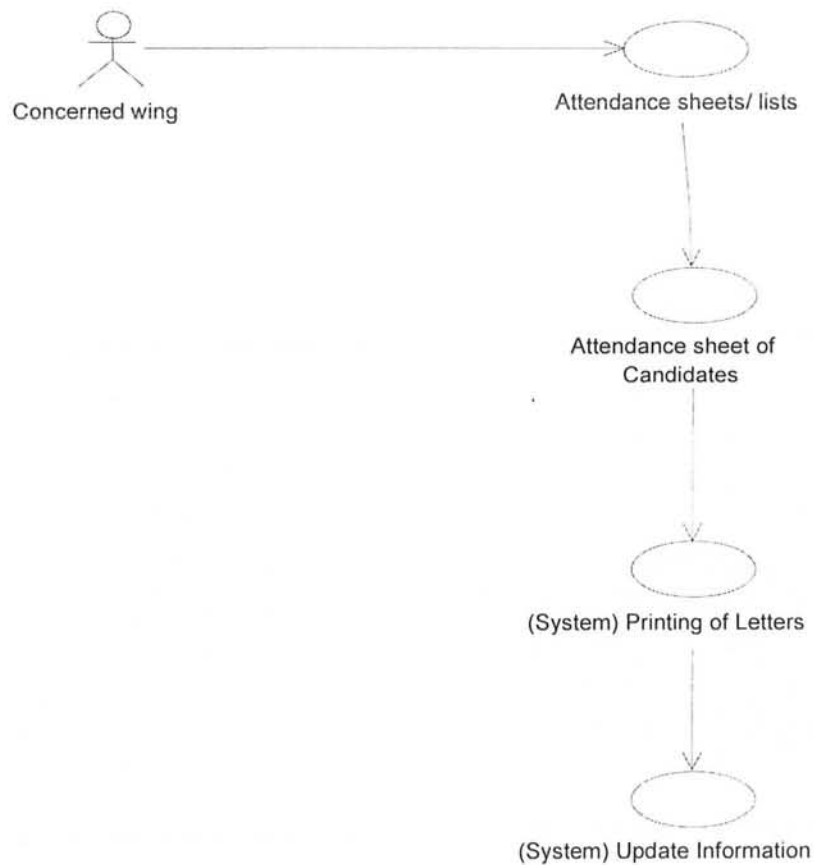
**Actors:** Computer wing

**Pre-Condition:** Roll no's assigned to candidates and screening test list is prepared.

**Post Condition:** Admission letters will be generated.

Actors Action	System Response
1. Timetable for S.T test is prepared and entered in the system.	1. Admission letters are prepared and will be sent to the users.

**Preparation/Printing of admission letters/ Attendance lists**



5.1.7.

**UC-07: Screening test list**

**Use Case Name:** Screening test list.

**Purpose:** List of candidates is prepared for screening test.

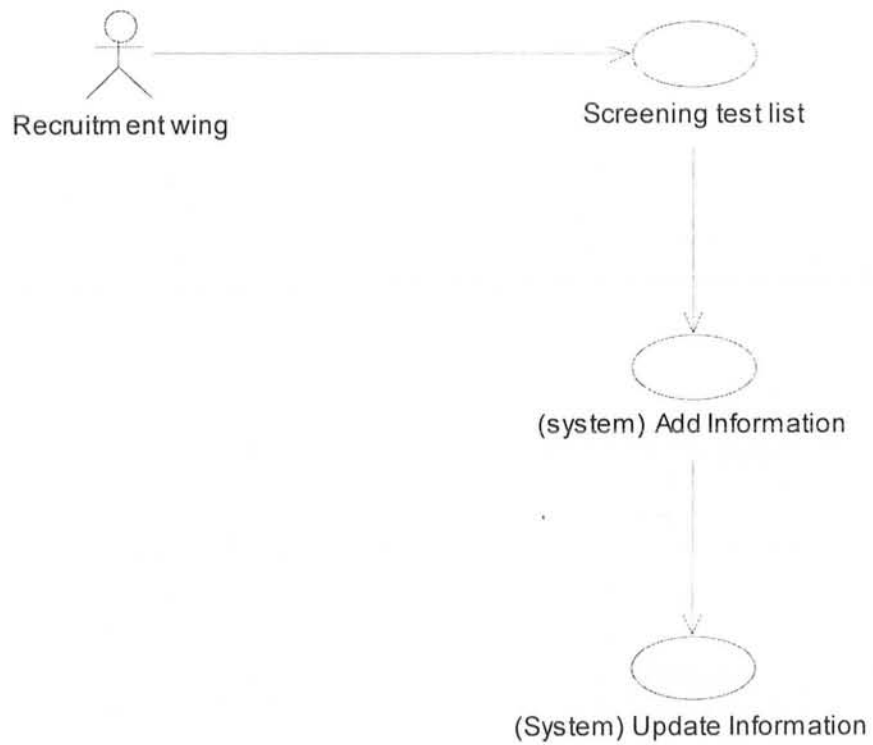
**Actors:** Assistant Director 3, System

**Pre-Condition:** Roll no's assigned to candidates.

**Post Condition:** Admission letters will be generated.

Actors Action	System Response
1. S.T test prepared from data bank MCQ's.	1.Center wise screening test list of the candidates will be prepared.

**S.T List**



### 5.1.8.

#### UC-08: Conduct MCQ test

**Use Case Name:**

**Purpose:** MCQ test is conducted of the candidates applying for a specific post.

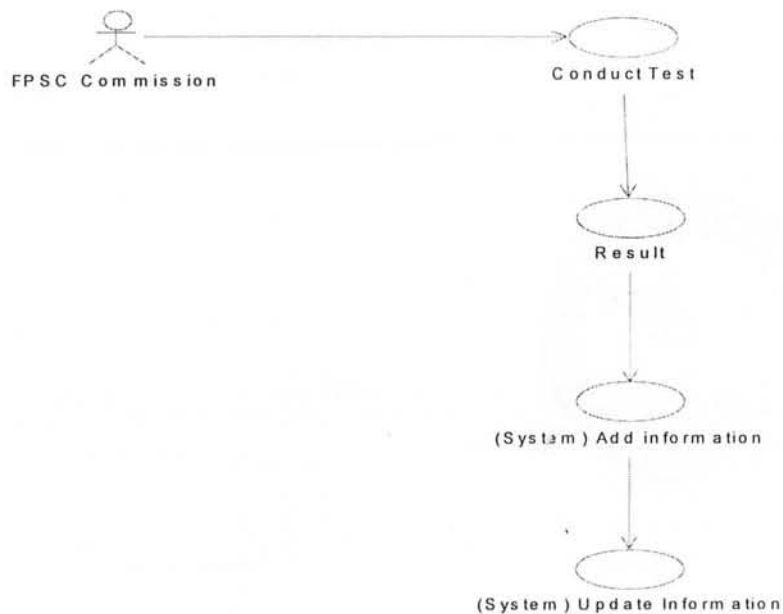
**Actors:** Secret wing

**Pre-Condition:** The applicant's data is entered, scrutinized and roll numbers are assigned

**Post Condition:**

Actors Action	System Response
1. The test conduction plan is prepared by the secret wing.	<ol style="list-style-type: none"><li>1. The Rectt wing will conduct screening test.</li><li>2. Attendance information of the candidates will be updated in the system.</li><li>3. Result information of the candidates is updated in the system.</li></ol>

#### Screening test



### 5.1.9.

#### UC-09: Generate result card for failed candidates

**Use Case Name:** Preparation of result card for failed candidates

**Purpose:** Result card is generated for the candidates who are failed in the test .

**Actors:** Recruitment Wing, System

**Pre-Condition:** Screening test is conducted.

**Alternate courses:** No alternate course.

**Post Condition:** Result cards for failed candidates are generated.

Actors Action	System Response
1. Detail result of candidates entered in the system.	1. Result cards for failed candidates are generated.

### 5.1.10.

#### UC-10: Scrutiny of the passed candidates applications

**Use Case Name:** Scrutiny of the applications as per gazetted rules

**Purpose:** Applications of the successful candidates are scrutinized to confirm their eligibility.

**Actors:** Recruitment wing

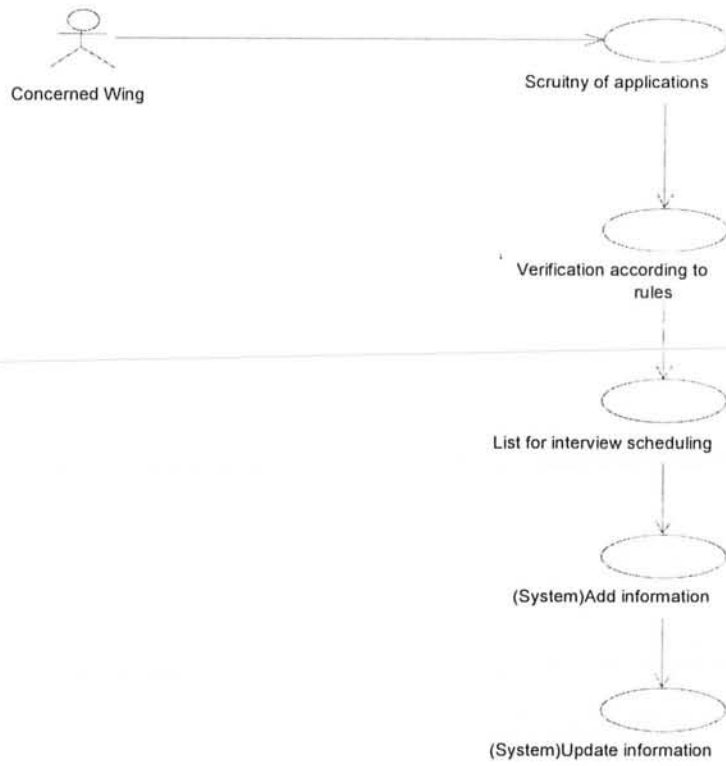
**Pre-Condition:** The test of the candidates is conducted and result is prepared.

**Alternate courses:** No alternate course.

**Post Condition:** Applications are scrutinized

Actors Action	System Response
1. The passed candidates list prepared for scrutiny of applications.	<ol style="list-style-type: none"><li>1. Applications will be scrutinized.</li><li>2. A list will be available for interview scheduling</li></ol>

## Scrutiny of the passed candidates applications



### 5.1.11.

#### UC-11: Requirements / Rejection letters

**Use Case Name:** Requirements / Rejection letters.

**Purpose:** Rejection letters for those applicants who doesn't lie according to gazette notification rule and requirement letter to those who have not provided the copies of documents claimed in the application.

**Actors:** AD (P), DD (P), System

**Pre-Condition:** The data of GR applicants is scrutinized as per gazetted notification

**Alternate courses:** No alternate course.

**Post Condition:** Rejection letters are issued

Actors Action	System Response
1. DD (P), AD (P) will press the print command for rejected / requirement cases.	1. System will print the letters as per defined format.

**5.1.12.**

**UC-12: Full data entry**

**Use Case Name:** Full data entry

**Brief Description:** Data entry of passed candidate's application

**Actors:** Computer Wing

**Pre-Condition:** Scrutiny of applications has been done.

**Alternate courses:** No alternate course.

**Post Condition:** Interview will be held.

<b>Actors Action</b>	<b>System Response</b>
1. K.P.Os will enter the full data of preselected candidates.	1. System will add the information. 2. System will update the data (in case the information needs to be updated)



### 5.1.13.

#### UC-13: Call letters for interview

**Use Case Name:** Interview letters

**Brief Description:** Interview letters are generated.

**Actors:** Recruitment Wing, System

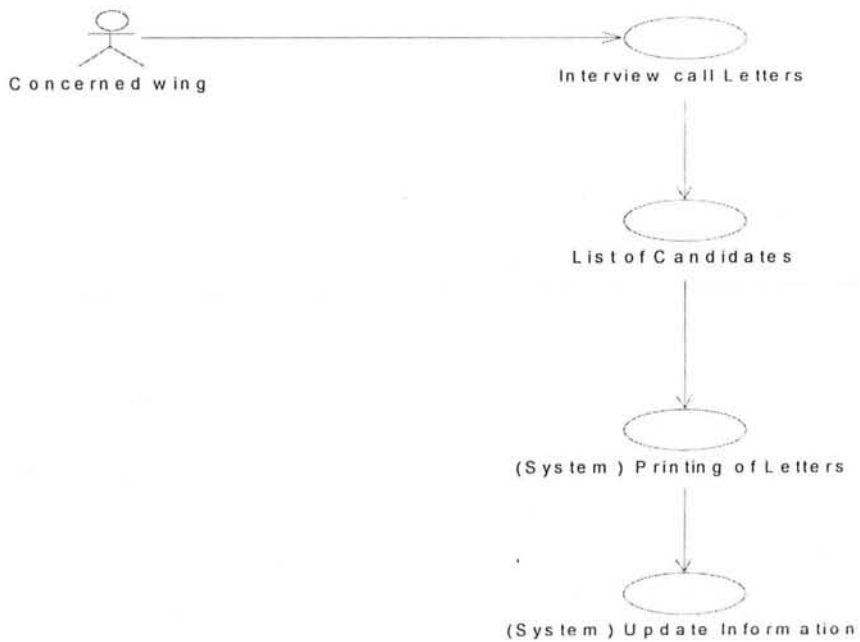
**Pre-Condition:** Pre-selection is completed.

**Alternate courses:** No alternate course.

**Post Condition:** Interview call letters will be generated by the system

Actors Action	System Response
1. DD (P), AD (P) will press the print command for interview letters.	1. Interview letters are generated for the preselected candidates.

#### Call letters for interview



### 5.1.14.

#### UC-14: Quota wise Merit List

**Use Case Name:** Merit List

**Brief Description:** Data entry of marks obtained by the candidates in interview.

**Actors:** Director, DG, DD, and KPO's

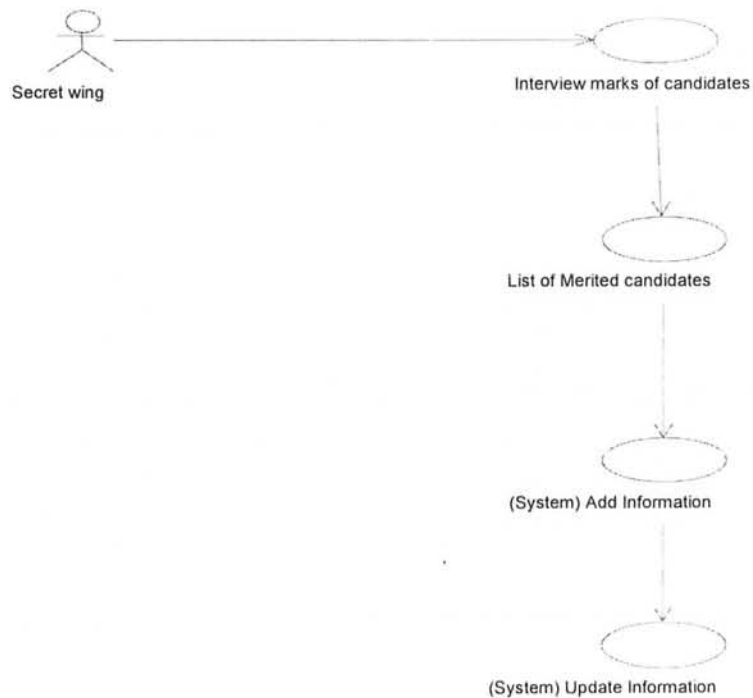
**Pre-Condition:** Candidate should have passed the interviews

**Alternate courses:** No alternate course.

**Post Condition:** Merit list is produced.

Actors Action	System Response
1. DG, DD (S), KPO's will enter the marks of interviewed passed candidate's quota wise.	1. System will add the information. 2. System will update the data.

#### Quota wise Merit List



5.1.15.

**UC-15: Recommendation letters to successful candidates / copy to departments.**

**Use Case Name:** Recommendation letters to successful candidates.

**Brief Description:** To issue nomination letters to final selected candidates for joining of the post.

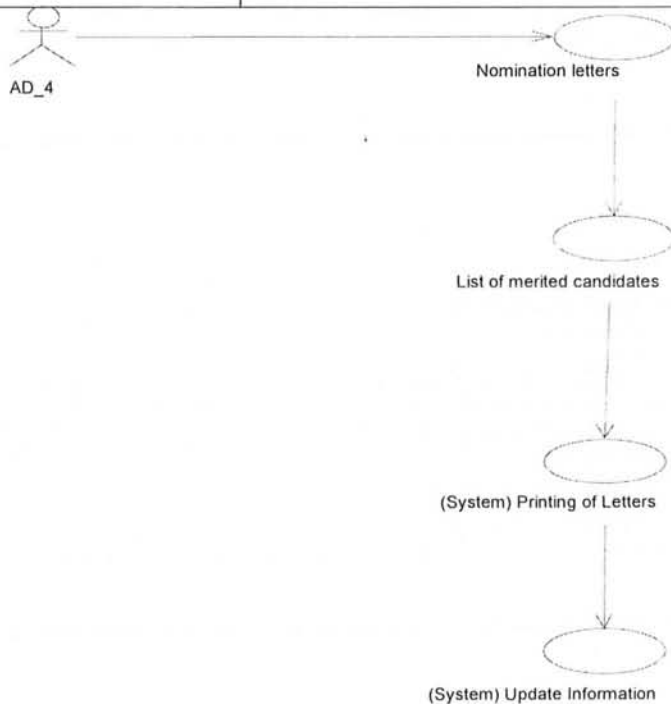
**Actors:** DG, AD (F), DD (F)

**Pre-Condition:** Successful candidates list, which have passed the test/interview and comes in the merit.

**Alternate courses:** To issue regret letters to these candidates who failed in interview or could not be nominated for appointment due to low merit position.

**Post Condition:** Prints of nomination letters

Actors Action	System Response
AD4 will press the print command for nomination letter for the test interviewed passed candidates. Copies will be sent to candidates and department.	1.system will print the letters according to defined format



Letters to Departments

**Use Case Name:** MCQ Data Bank

**Brief Description:** This use case describes the data bank of MCQ and conducting Computer Based testing (CBT) exam.

**Actors:** Secretary, Director & Assistant Director, KPO's, Examiners, Chief Psychologists

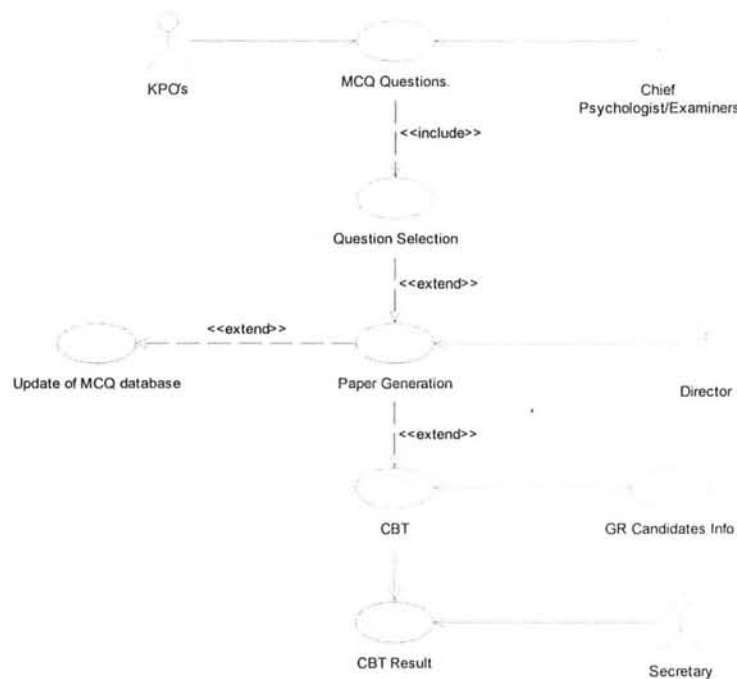
**Pre-Condition:** There must be MCQ questions available from examiners.

**Post Condition:** MCQ questions selection for the generation of question paper screening test.

**Primary Flow:**

1. Questions for the MCQ Data Bank (UC-MCQ-01).
2. Question Selection (UC- MCQ-02)
3. MCQ Paper Generation(UC - MCQ-03)
4. Updating of MCQ database (UC - MCQ-04)
5. Candidates for Recruitment post (UC - MCQ-05)
6. Conducting CBT test (UC - MCQ-06)
7. Result of the CBT test (UC- MCQ-07)

**Use Case Diagram for Data Bank**



### 5.2.1.

#### UC- MCQ-01: MCQ Questions

**Use Case Name:** MCQ Questions.

**Purpose:** to prepare the MCQ question data bank for different recruitment exam.

**Actors:** Chief Psychologist, KPO's, and Examiners

**Use Case Model:** MCQ Data Bank

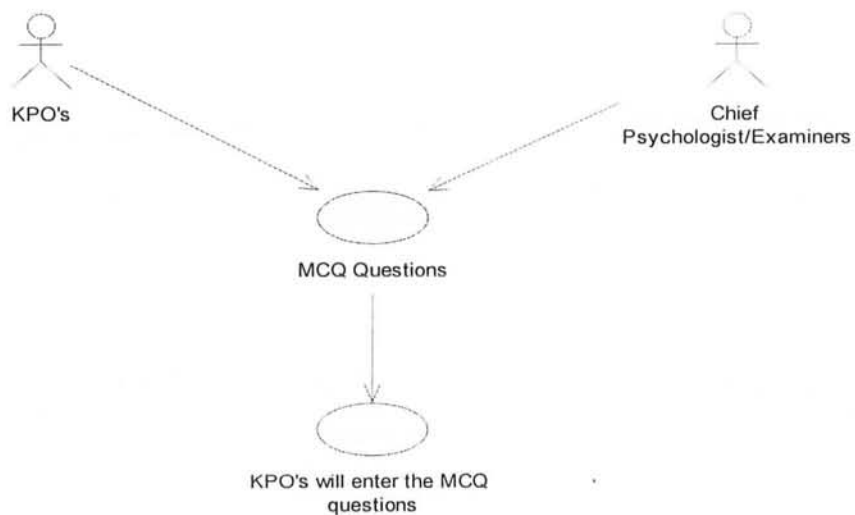
**Pre-Condition:** there should be MCQ database

**Alternate courses:** No alternate course.

**Post Condition:** System will store the MCQ Questions

Actors Action	System Response
1. KPO's will enter the MCQ questions	<ol style="list-style-type: none"><li>1. System will add the question.</li><li>2. System will update the MCQ database</li></ol>

#### MCQ Questions



### 5.2.2.

#### UC- MCQ-02: Questions Selection

**Use Case Name:** Questions Selection.

**Purpose:** to select the question from the MCQ data bank. Once the question is selected, it should be automatically locked for the next 4 or 5 years.

**Actors:** System

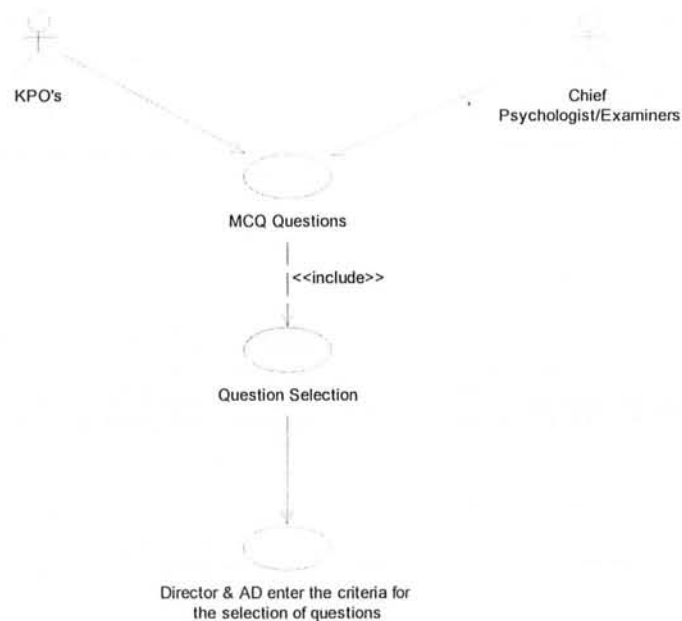
**Pre-Condition:** there should be MCQ questions entered in the system

**Alternate course:** No alternate course.

**Post Condition:** Questions are selected randomly.

Actors Action	System Response
1. Director and AD will enter the criteria for the selection of questions from the MCQ databank.	1. System will retrieve the MCQ question as per criteria.

### Questions Selection



### 5.2.3.

#### UC- MCQ-03: MCQ Paper Generation

**Use Case Name:** MCQ Paper Generation.

**Purpose:** MCQ paper will be generated from the selected questions for a particular examination.

**Actors:** DD, AD, System

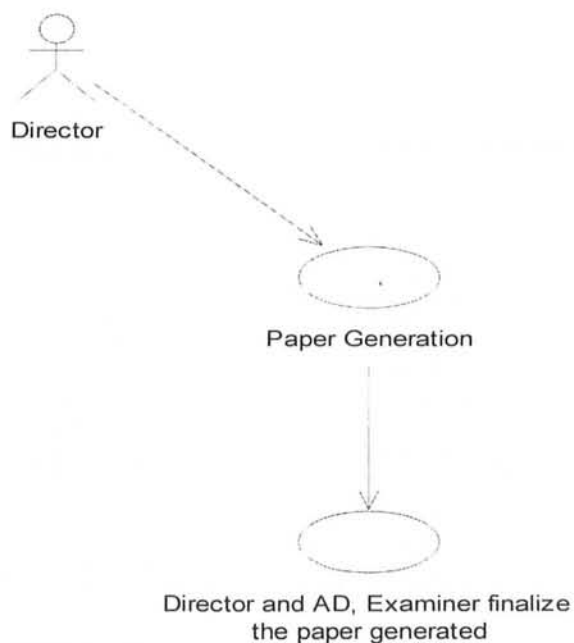
**Pre-Condition:** there should be MCQ questions entered in the system

**Alternate courses:** No alternate course.

**Post Condition:** MCQ paper is generated

Actors Action	System Response
1. Director and AD, Examiner will finalize the paper generated from automatic question selection.	<ol style="list-style-type: none"><li>1. MCQ paper will be generated from the automatic question selection.</li><li>2. System will have capability that Director / AD can change the question manually from automatically selected questions list.</li></ol>

#### MCQ Paper Generation



#### 5.2.4.

#### UC- MCQ-04: Update of MCQ database

**Use Case Name:** Update of MCQ database.

**Purpose:** MCQ database will be updated with new generated MCQ paper information.

The records of the question in the database will be updated.

**Actors:** System

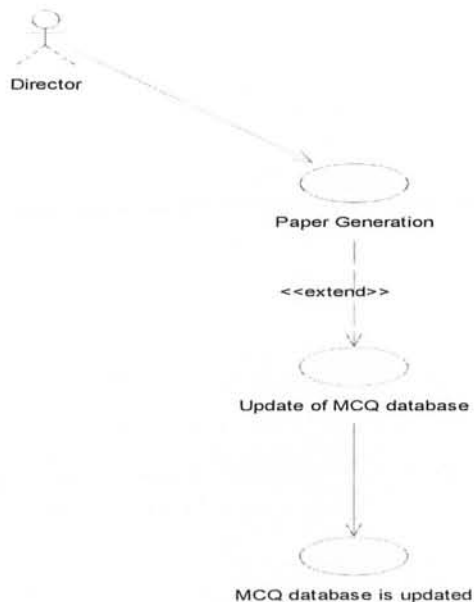
**Pre-Condition:** MCQ paper is generated.

**Alternate courses:** No alternate course.

**Post Condition:** MCQ database is updated.

Actors Action	System Response
Paper information is provided to update MCQ database	1. MCQ database will be updated with information of the questions appeared in an examination

#### Update of MCQ database





5.2.5.

**UC- MCQ-05: Candidates List**

**Use Case Name:** GR Candidates.

**Brief Description:** Scrutinized candidates list who have applied for a particular recruitment post

**Actors:** System

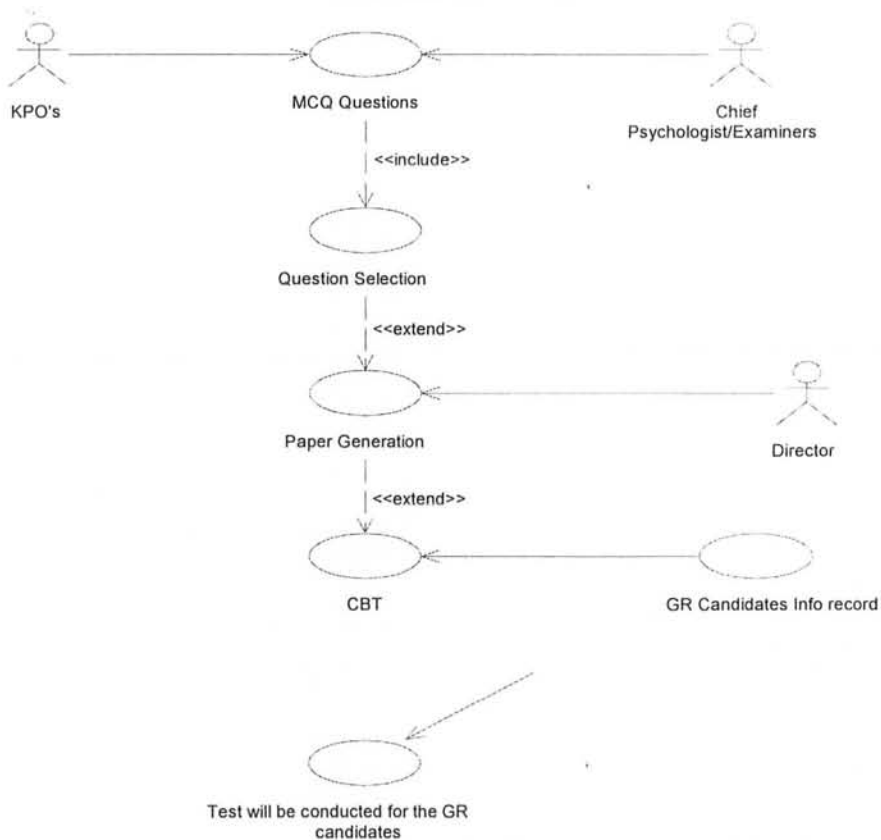
**Cross reference:** Users, System

**Pre-Condition:** MCQ paper is prepared.

**Post Condition:** Test will be conducted for the candidates for a particular post

Actors Action	System Response
GR candidate listing is initiated	1. GR candidates list will be generated for a particular test / case.

**Candidates List**



5.2.6.

**UC- MCQ-06: CBT (Computer Based Test)**

**Use Case Name:** CBT

**Purpose:** To conduct the CBT on Computer generated MCQ paper.

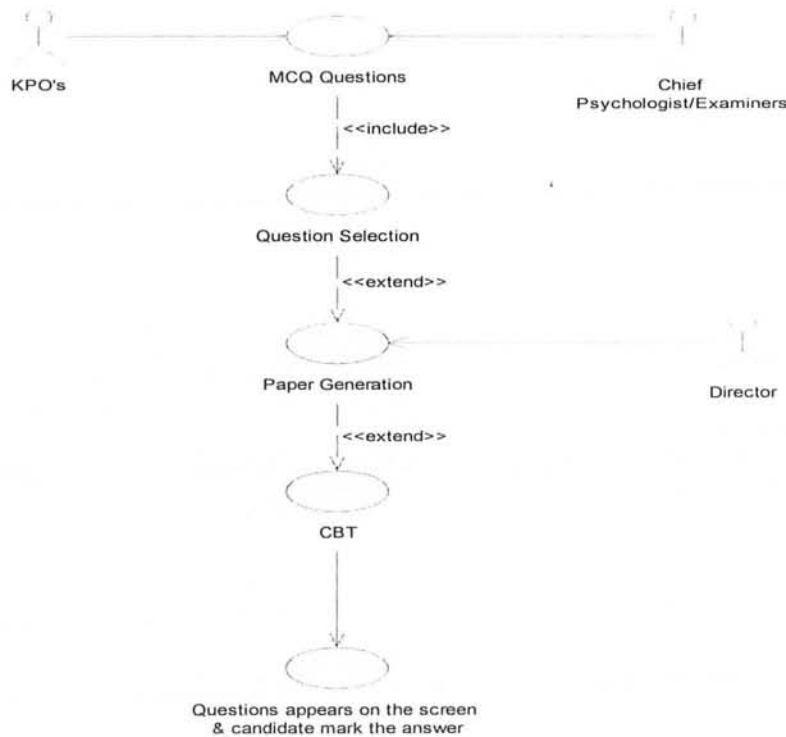
**Actors:** Users, System

**Pre-Condition:** MCQ paper is generated and list of GR candidates is available.

**Post Condition:** Question appear on the screen and candidate mark the answer from the choices.

Actors Action	System Response
1. The test schedule entered in the system.	1. The System will login the candidate for taking the test 2. MCQ questions will appear on the screen. 3. System will keep the candidates answer information in the database. 4. Each candidate will be given specific time to answer the paper. Paper will automatically finish after the specific time.

**CBT Test**



### 5.2.7.

#### UC- MCQ-07: Result CBT

**Use Case Name:** Result CBT.

**Purpose:** To calculate and show the CBT result

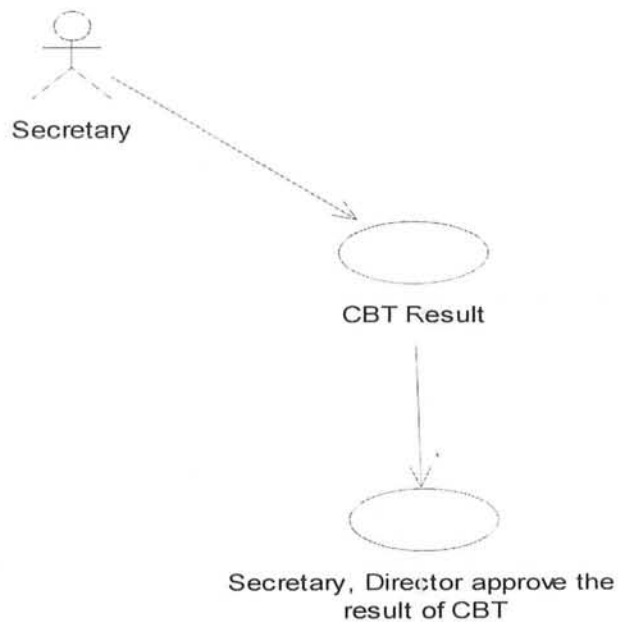
**Actors:** Secretary, Chairman, System

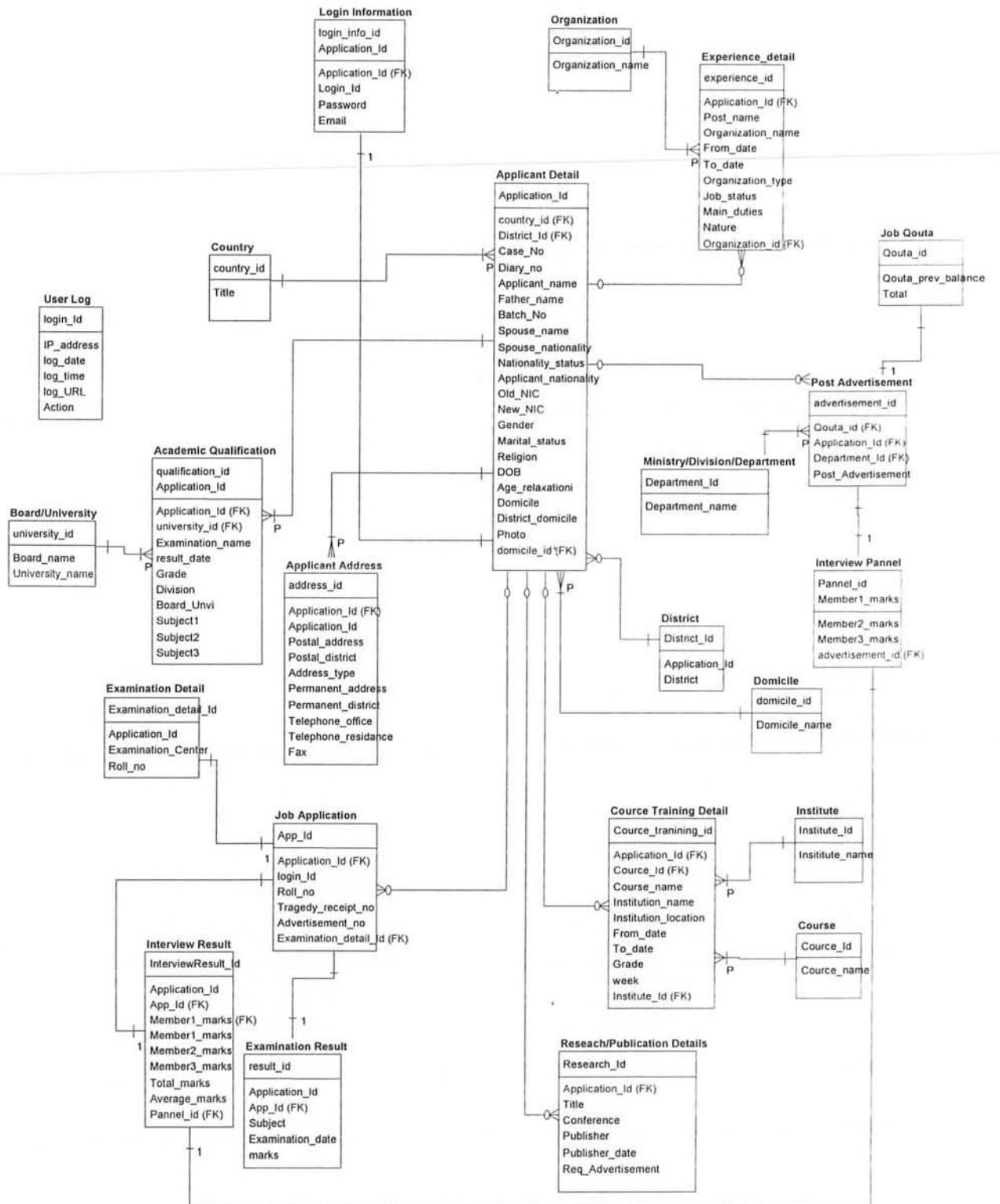
**Pre-Condition:** The test of the candidates is conducted.

**Post Condition:** Result will be displayed on the screen.

Actors Action	System Response
1. Secretary, Director will approve the result of CBT.	1. The result will be shown after completion of test time.

#### Result CBT





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6. TOOLS  
&  
TECHNOLOGY

## 6.1 What Is A Dynamic Webpage?

If you surf around the Internet today, you will see that there are a lot of static web pages out there. A static web page is essentially a page whose content consist of some HTML pages that was typed directly into a text editor and saved as an HTM or HTML file. Thus the author of the page has already completely determined the exact content of the page.

Static web pages are quite easy to spot, some time you can pick them out by just looking at the content of the page. The contents (e.g. text, images hyperlink etc) and appearance of the static web page is always the same regardless of who visit the page, or when they visit, or how they arrive at the page, or any other factors.

## 6.2 Static Pages Vs Dynamic Pages

- ✓ Lets think for a moment how a static, pure HTML page finds its way into a client Browser
- ✓ A web author writer pages composed of pure HTML, and save it within an HTML file.
- ✓ Some time later a user type a page request into a Browser, and the request is passed from the Browser in to the web server.
- ✓ The web server locates the .html page.
- ✓ The web server sends the HTML stream back across the network to the Browser.
- ✓ The Browser processes the HTML and displays the page.

## 6.3 The Limitations Of Static Web Pages

If we want to enhance our page so that it displays the current time or a special message that is personalize for each user. It will not be possible using HTML alone.

## 6.4 Active Server Pages (ASP)

So far we have analyzed the difference between static and dynamic web pages , but we have barely mentioned the active server pages (ASP) , here is a simple definition of ASP.

Active Server Pages is a technology that allows for the programmatic construction of HTML pages just before they are delivered to the Browser.

In other words ASP we can write a set of instructions that can be used to generate HTML, just after the web page has been requested by a client, and just before it delivered .It is a

perfect tool for any HYML write to add to the toolkit, because it gives us the power and flexibility to generate fresher HTML and ultimately to reduce more spectacular, interactive, personalized, up-to-date web pages.

How can we describe ASP? It is not a language like other high level languages like (Pascal & C++) although it does make use of existing scripting languages such as VB Script and Java script, more ever it is not really an application like Front page and MS Word, Instead we describe ASP using rather a more ambiguous term technology.

### **6.5 — ASP Code Is Browser Independent**

ASP code is always executed on the web server, and generates pure HTML. The client machine does not need to provide any kind of ASP support at all. Infact the web Browser handles .html pages an ASP page in exactly the same way because from the Browser point of view, the process involves the sending the page request to a web server and receiving a stream of pure HTML.

The Browser is blissfully ignorant of any ASP processing that might be happening on the server, it only ever get to see pure HTML, so dynamic ASP pages are just view able in internet explorer, Netscape Navigator and other Browsers as their static .html counter parts.

### **6.6 Advantages Of Using A Server Side Technology**

We have stressed that ASP is processed on the web server to generate HTML. While HTML is processed solely on the Browser, so what see what are the main advantages of performing actions on the web server first? Here are some main advantages of that:

- ✓ Allow you to run programs in programming language that are not supported by your Browser.
- ✓ Enable you to program dynamic web applications Browser independently, without recourse to client side programming features such as Java applet, Dynamic HTML, Active X control, all of which are Browser specific.
- ✓ Can provide the client (Browser) with data that does not reside at the client.
- ✓ Often makes for quicker loading time than with client side dynamic web technologies such as Java applet or Active X controls, because at the en you are actually downloading a page of HTML.
- ✓ Provides improper security n.easures, since you can write code, which can never be viewed, from the Browser.

That is not to say that the ASP pages are perfect e.g. they increase the workload on the server so if your web site becomes popular you may need to invest more hardware, but this is true, server-side functionality outweigh any disadvantages.

## 6.7 Virtual Directories

How does this relationship works? In fact it can work by creating a second directory structure on the web server machine, which reflects of our web site.

The first directory structure is what we see when we open windows explorer on the web server these are known as physical directories (e .g c:\My document)

The second directory structure is the one that reflects the structure of the web site. This consists of hierarchy of virtual directories. We use the web server to create virtual directories, and to set the relationship between the virtual directories and the real directories.

Virtual directory is in fact a nickname or alias for a physical directory that exist on the web server machine. The idea is that when the user Browser to the web page that is contained in the physical directory on the server. They don't use the name of the physical directory to get there instead; they use the physical directory nickname.

To see how this might be useful, consider a web site that publishes news about many sporting events. In order to organize this web site carefully the web master has to build a physical directory structure on the hard disk, which looks like this.

Now to visit this web site in order to get the latest news on the javelin event in the Olympics: If the URL of this web site were based on the physical directory structure, then it would be something like this:

<http://www.oursportsite.com/sportsnews/atletics/field/javelin/default.asp>

It's the webmaster who can understand this directory structure, but its fairly unmemorable web address! So to make it easier for the user, they web master can assign a virtual directory name or alias to this directory its act just like a nick name of this directory



Let's assign the virtual name javelin news to the c:\inetpub\...\javelin\directory. Then the URL of the latest javelin news would be as:

`http://www.oursportsite.com/javelinnews/default.asp`

Not only thus this saves the user from long and wide URLs but it also serves as a good security measure, because it hides the physical directory structures from all the web site visitors.

## **6.8 Microsoft FrontPage**

It comes as a part of MS office 2000 suite. It is one of the tools for creating and designing web pages but it does not offer all functionality of visual Interdev. It is ultimately a weaker but easier application to use.

It offers three views of the web page. The normal view gives a WYS? WYG page creation view, which allows you to write pages without having to code to HTML explicitly. The HTML view allows you to write your code explicitly and the preview tabs gives a quick view of what a page should look like in a Browser.

Again a normal and a preview tabs are unable to process any ASP. In order to view the results of ASP script in Front page select file view in the Browser to see what your processed Asp will look like.

## **6.9 Notepad**

Certainly helps in sustaining its popularity it does not highlight the ASP in any way and also it doesn't generate any extra code even having less additional functionality. It is still very popular in use due to its simplicity and less complexity in Windows 2000. Notepad offers a "Goto" feature, which helps in quickly moving around the document using the line number.

It does not really matter which editor is to be used. We will avoid any attempt to provide a tutorial on additional tools at its beyond the scope of this book.

## 6.10 Identifying a Script

How do we identify the script when it is embedded in a small or large amount of pure HTML? Because the ASP which will be enclosed in a special tag `<%.....%>` e.g. if we want to print a time on a web page we will use the following piece of code:

```
The current time is <%=time %>
```

Every thing within `<%` and `%>` this tag is assumed to be the ASP and a sent to the ASP script host for processing.

But there are other kinds of scripts , what are not ASP code , but which still need to o be distinguish from the HTML and the text in which they are embedded . For this reason HTML provides a special tag called `<script>` tag e.g. ,

```
<SCR IPT LANGUAGE =VB SCRIPT RUNAT=SERVER>  
    Response.Write time  
</ SCRIPT>
```

Any thing that lies between the opening and the closing tags `<SCRIPT>` and closing tag `</SCRIPT>` is dispatched for processing to the appropriate script engine, according to the instructions given by the `SCRIPT` tags attributes.

## 6.11 Server-Side Scripting

A script that is interpreted by the web server is called a server side script . A server side script is an instruction set that is processed by the server and which generates the HTML is sent as a part of the HTTP response to the browser.

As we have gathered by now ASP is server side scripting, however it is not true to say that all server side scripting as not ASP as we will elaborate in the following section.

If we are going to place any kind of server side script so that the server can identify them as a server side scripts and hence arrange for them to be interpreted correctly. There are two ways to label server side scripts

- ✓ Use the `<%...%>` server script delimiters, which denote ASP code.
- ✓ Use the HTML `<script>` tag specifying the `RUNAT= SERVER` attribute within the tag. If a tag like this is found within an ASP file, then it is treated as an ASP. If such a tag is found within an .html file, then it is treated as a non-ASP client side script.

We must highlight an important difference here namely that the choice of HTML or ASP for the suffix of the web page file is not trivial. It really does have a bearing on how your code is processed. If you have any ASP at all, you can label it, using either of the techniques used above. However in order to ensure that it is processed as an ASP then it must be included as a part of the ASP file.

Within an HTML file, it is only possible to use the `<SCRIPT>...</SCRIPT>` tags. Script contained within these tags will be interpreted as non-ASP script. If you try to include any ASP script within these tags or if you write `<%...%>` into an HTML file, then the script will not be executed and your web page would not look the way you intended .

## 6.12 Client-Side Scripting

The script that is interpreted by the browser is called a client side script. A client side script is also an instruction set but is not processed by the web server. Instead it is sent to the Browser (as part of the HTTP response) and is processed by the Browser, the Browser on the monitor then displays the result.

Client side scripting is not directly related to ASP at all, it involves scripting that will be processed by the Browser. When a web page source contains a client side script, it does not attempt to process the script; instead, it simply downloads the script to the Browser as part of the HTTP response, and assumes that the Browser will know how to deal with it.

When the Browser receives the HTTP response, it needs to process the HTML contained within, which describe how it is to display the page. The Browser must also take care of the client side script that when downloaded as part of the page.

### 6.13 Advantages of Client-Side Scripting

- ✓ The main advantage of client-side scripting over pure HTML is that it allows the developer to create the more functional, interactive web pages.
- ✓ Response time is often quicker because the script is interpreted on the Browser machine, there is no network involved and there is no round-trip to ask the server to calculate things.
- ✓ Executing script on the Browser reduces the web server's workload as less script will be executed on the server, and it can be more advantageous when lots of people use web site.

### 6.14 Disadvantages of Client-Side Scripting

The main disadvantage of client side scripting is that we can't depend on the functionality of the Browser to support the script we write. If you have two different client machines hosting two different Browsers, and you view a page containing client side scripting on each independently then you can reasonably expect the results to be quite different. This means that the client side scripting is Browser specific because some browser does not support certain scripting language e.g.

- ✓ Recent version of Internet explorer comes with script engines for both VBScript and Jscript, whereas the older version of the Browser by default come with the older version of the scripting engines.
- ✓ Netscape navigator comes with Java script engine only so there is no support for VBScript.

Another potential disadvantage of client-side scripting is that the code in your client-side scripts is completely visible to the user. By selecting view source option in the Internet explorer will show how the HTML source code plus client-side scripting used in that page. If you want to keep your client-side script to be hidden then you will have to use complex encryption techniques.

### 6.15 Alternatives to ASP

What other technologies could do the same job as ASP? Or if Microsoft provides ASP then what are the non-Microsoft alternatives?

ASP is only one of several technologies that can be used to create more dynamic and interactive web pages. Microsoft is not the only organization pulling in the direction of interactive web sites many of its competitors are also chipping away at the boundaries of interactive web capability.

Interactive web sites can be build with a combination of languages and technologies you can use any one of these alone, or any number of them together and they are all independent (in the sense that you do not have to learn one technology before you can learn another). Some exist on the client side while other on server side.

### **6.16 What Is Active Server Pages Object Model?**

In the Active Server Pages programming model, there is a wide range of functionality that is access able to the programmer. ASP helps us to track the site of a user dynamic generate HTML output and take data from forms to be inserted into a data base. All of the functionality makes ASP a rather complex beast. Microsoft was task with finding the best compromise between offering a simple programming model and providing access to all of the power that ASP provides. These objects were then related together into what is known as an object model.

An object model is a representation of a set of objects and there relationships to one another. These relationships can take to form of containment, where one object is embedded inside of another or they can take the form of a parent child relationship, where one object has a set of child objects associated with it.

### **6.17 Object Model Structure**

Seven objects make up the core of Active Server Pages. These are known as the built-in objects. These objects are:

- ✓ Server Object
- ✓ Application Object
- ✓ Session Object
- ✓ Request Object
- ✓ Response Object
- ✓ Object Context Object
- ✓ ASP Error Object

Each of these objects interacts with the different parts of the ASP system. This chart shows how they are related to each of them, and how they are related to the client and the server.

### **6.17.1 The Server Object**

The server object is an object that provides a home to a miscellaneous ragbag of properties and methods that can be send in almost every Active Server Page. While seemingly unrelated, these methods and properties are in fact abstractions of the properties and methods provided by the web server itself. This object will allow you to do things such as:

- ✓ Set the amount of time a script can run before an error occurs.
- ✓ Take a user supplied string and encode it into an HTML format.
- ✓ Convert a Virtual path to a physical path on the server.
- ✓ Take a user supplied string and encode it into the proper format for a Uniform Resource Locator (URL) string.
- ✓ Create an instance of an Active X component. Change the course of execution by jumping to another page using the transfer and execute properties.

These method and properties are provided as utility functions for you to use in your pages. They are not directly used to affect the display of the page, but they still provide value able support in creating Active Server Pages

### **6.17.2 Application Object**

As the web is moving from just serving up pages to providing access to dynamic information from a wide range of systems, the site that a user must access are beginning to look more like a traditional desktop application.

Since these pages are functioning together as an application, naturally the developer would want some control over the application as a whole; this is the responsibility of an application object. Let's just introduce the few things that it does. With this object one can:

- ✓ Be notified when an application is first started, so that you can perform some startup processing.
- ✓ Be notified when an application is ending, so that you have an opportunity to perform functions to enable the application to close down cleanly.
- ✓ Store information that can be accessed by all clients accessing the application.

There is the one instance of an application object for each web application running on the web server. There may be many clients accessing the same application. They each can get a reference to the same application object. Next we will look at an object that is unique to each client of an application.

### **6.17.3 Session object**

There is one application object for each application on the web server. Every client accessing that application can get a reference to it. Each of these clients opens a session therefore each of them has a reference to a unique session object. The session object will allow you to:

- ✓ Be notified when a user session begins, so that you can take an appropriate action for a new client.
- ✓ Be notified when a client has ended their session, this can either be caused by a time out or an explicit method called Abandon.
- ✓ Store information that can only be accessed by the particular client through out the session.

The session object is the most powerful object for continuity when using an application in Active Server Pages. One of the problems that has existed in creating web-based applications is that the connection between the client and the server is stateless. The web server itself has no mechanism for tying a request for a page by a client back to a previous request of the page by the same client. This means that each request that one-client makes of a web server is treated independently from the rest. While this allows for a very efficient and fast web server, it makes writing application nearly impossible.

Think of it this way if you are writing an application using a standard web server, then every request to the server must carry along with it every thing that you have done related to the application up to this point. Since the web server has no way of sending and

retrieving that information, it is up to you provide it every time you make a request to the server. Sounds pretty cumbersome? Well with the session object Active Server pages allow you to store and retrieve information about the client accessing your application.

#### 6.17.4 Request Object

When a web Browser or other client application asks for a page from a web server, this is called making a request. Along with the actual page the client wants, it can send a great deal of information to the server as well. The request object is responsible for packaging up that information to make it easily accessible to the ASP application.

The client asks the server to create an HTML page by requesting an ASP script. When the server sees this request, it interprets this type of page as an active Server page. All of the information that the client is sending along with the request is then packaged into the request object. This information is then accessible to the actual ASP script that is used to construct the page.

The information is cauterized into five sets of information. Since each set of information can include multiple individual pieces of information, each set is stored as a collection. In a collection each piece of information is sent as a name-value pair.

The collection holds information about:

- ✓ The values that are provided in the URL that are send by the client. In the URL the client can include name value pairs of information after the file name. This information is stored in the collection called query string.
- ✓ If the client is sending request, then the values of the form elements are stored in anothe4 collection the form collection.
- ✓ If the web server itself has a greater deal of information about the request, response and the general information about the server itself. These are called the HTTP server variables. This information is made available as a collection as well.
- ✓ If the client is sending any cookies along with the request, these are included in their own collection.
- ✓ In addition, if the client is sending any security certificates to the server, then these are included in there own collection.

By using the information that is included with the request, along with the script code in the active server pages script file, the server can dynamically generate a page for the



client to display. In order for the client to display the information, the server needs a mechanism to replay the data back to the client. This is the job of the response object.

### **6.17.5 Response Object**

The primary features of the Active Server Pages are the ability to dynamically create web pages. The basic task needed to execute this feature is the ability to tell the client what information to displays. There are a number of different ways to shape what the client will display. The response object exists to provide an efficient interface to control the output to the client.

The response object provides the ASP script with a set of interface that allows the script to control what information is being sent back to the client. For now we will just touch the some of the functions that the response object provides.

With the response object the ASP script can:

- ✓ Insert information into the page being sent back to the client.
- ✓ Select instruction to the Browser to create cookies on the client.
- ✓ Send the client to another page via a redirection.
- ✓ Control whether the page is sent as it is created, or it is completely build and then sent at one time.
- ✓ Control the various properties of the page such as the HTML header or the type of content.

These interfaces give the designer of the script the ultimately flexibility to decode how the information is presented back to the client.

### **6.17.6 Object Context Object**

The object context object helps you to develop application out of components. It does this by allowing you to handles transaction from within an ASP page. A transaction is a single unit of work that must either succeed in its entirety or if its fail, must be undone completely – returning the system to the state it was before the transaction was started.

When using applications made of out of components, its common to use transitions. If for example an action handled by a particular component fails then you'd want details of the failure and be able to take an alternative course of action. If he user tried to change the details of their bank accounts and then bombed out mid – track it would be logical to

want track back to what the bank to what the bank account details were previously, before trying to change the details again or continuing on alternative course.

The second type of application that uses transactions would be one that features data processing. If some one makes an other alternative to a data base via a web page and somebody else make another alternative at the same time, you need to be able to accept one alternation, while canceling or postponing, the other. The management of these types of transactions was handled in HS 4.0 and PWS 4.0 by a piece of software known as Microsoft Transaction Server (MTS). How ever with HSS and Windows 2000, the functionality of MTS is now integrated directly into part of the windows 2000 operating system known as COM+.

The object context object allows access to MTS in order to start or terminate a transaction. We don't want to go into how it does now, this hope fully gives you an over view of this useful object.

#### **6.17.7 ASP Error Object**

The ASP Error object contains the detail of any error generated by an ASP script or by an ASP-DLL itself. Previously there was no facility in ASP for storing details of errors that occurred. ASP Error object with help from the server. Get last error method; allow more complex customized handling of error messages. It directs the user to a standard error page or to user created page depending on the option selected in MMC.

#### **6.18 Active Server Components**

Active Server components are components or DLL that come freely with ASP (as opposed to components that are wended by third parties). There are ten common components provided by Microsoft with IIS 9.0 90(although different versions of the installation can add or remove components), and many more are available from third parties. Here is a brief summary of the components and what they do:

- ✓ The AD rotator component do exactly what you might expect, it is a rotator for the Ad's that appear on your page. More specifically we use this component by supplying with a list of images, it will arrange for one of the image to be displayed on the page each time the age is requested.

- ✓ The Browser capability components references a file called browscap.ini which details the every version of every Microsoft and Netscape Browser every created it uses this information to determine whether or not the browser currently used supported frame, tables and so.
- ✓ The content linking component uses a text file to manage (and provide) links for a sequential set of web pages. It allows the administrator to provide extra information about each page in the sequence, and keeps the link in an orderly list so that they can be easily mentioned. For example, it can be predetermined order used to guide a visitor through a sequence of pages in a
- ✓ The Content Rotator component is a slimmed –down version of the Ad rotator component, which just displays text.
- ✓ The content component creates an object that persists for the lifetime of n application and can be used to store, increment or retrieve a value. Counters are manually set, unlike page counter e.g. which are set automatically, and persist until deleted.
- ✓ The logging utility componer.t allow your application to be able to read from your LLS log file which monitor who has been connecting to your site
- ✓ The My info component is used to store personal information about the server administration.
- ✓ The page counter components provide a page counter, which increments by one each time a page is accessed. This is an automatic process, rather than a user defined one.
- ✓ The permission checker component can be used to monitor whether a certain user has been given permission to read or execute a file.

The tools component provides a set of properties that are loosely grouped under the catchall heading of miscellaneous utilities, include checks to see if a certain file exist exists or if a certain user is the owner of the site.

### **6.19 Universal Data Access**

Any persisted collection of information is a data store. We might want to access the data contained within and use it in our web pages and other applications we are particularly interested in how we can access data stores from our ASP pages, and use there data to influence the appearance and content of our dynamic web pages.

So the question is one of how to access the data contained within these data stores. There is a problem with using ODBC here generally, the information contained within each of the other media does not fit neatly into a data base type format and more often than not, ODBC can't help us to get at that kind of data.

In other words the notation of database access is not enough to fill the dreams of universal data access; we need a way of getting at the other forms of the data too, so how can we get at the contents of your data stores quickly and easily?

Microsoft UDA strategy has yielded a technology that has the potential to access the data contained in any kind of data stores. This technology is known as OLE-DB

## 6.20 What Is ADO's?

You might like to think of the Active X Data Objects (ADO) as being the interface of OLE-DB. ADO is a set of objects that allow programmers to program their data access login from languages and scripting languages. ADO is a high level model than OLE-DB, which means that it simplifies some of the complexities of programming which OLE-DB thus, ADO is much easier to use than OLE-DB.

How thus ADO fit into over all structure? The ADO layer sit neatly between the application itself and the OLE-DB layer.

In this sense we can think of ADO as being as application-programming interface. ADO is a superset of DAO and ADO is much easier to understand.

## 6.21 ADO Features

- ✓ Access to all type of data. Various data sources including Email, text files ISAM/VSAM databases and all ODBC data sources.
- ✓ Support Free threading-ADO supports multiple client connections through multiple threads in such away that these threads don't interfere with each other.
- ✓ Support asynchronous queries. This basically means that after an SQL query is submitted to the data base server, the control then immediately returns to the calling application, allowing the user to complete the query, the results are then sent to the client.
- ✓ Support client side and server side cursors –Cursor is a mechanism that allows access a navigation of the data in a record set. They are implemented as a client side or a server side. Traditionally, frequently updated record set is implemented as a server side while read only record set is implemented as a client side.

- ✓ Support disconnected record set – After a record set is returned on a execution of a query, it is stored as a client side cursor and the active connection is closed. After changes have been committed to the record set the connection is re established and all up dates arte sent in a batch to the data store. . This helps in reducing network traffic in a great extent.
- ✓ Support commands as a common method – The unique feature of ADO is that when a command is executed, a connection is first established internally before that commands get submitted for execution. Compare this to a traditional object model like DAO/RAO where a connection has to establish explicitly before a command can be submitted.

## 6.22 ADO Architecture

In the ADO model there are five objects

- ✓ Connection
- ✓ Command
- ✓ Record set
- ✓ Record
- ✓ Stream

The connection object sets up the connection to the data source. First the data source name, its location, user id, password is stored in a connection string object, which is passed to the connection object to establish z connection to the data source.

The command button is used to execute the SQL commands, queries and stored procedures.

When a query is executed it returns results that are stored in the Record set object. Data in a record set is manipulated and then updated to the database.

Records allow you to handle data kept in semi structured storage (such as files in a directory structure) as through they were record in a database.

The stream object is used to access the contents of the node, such as an Email message, or a web page.

### 6.23 ADO and ASP Are Different Technologies

Don't fall into the trap of assuming that ADO is a part of ASP or that it is designed specifically for use with ASP. It is true to say that ADO is the ideal tool to use for achieving data access from ASP pages and that ADO is shipped as part of the HS 9.0/ASP 3.0 package. But ADO is more generic than that. If you are planning to write other data-dependent applications such as Visual Basic, Java, VC++, there is nothing to stop you from using ADO in those applications too.

In fact you can use ADO with any COM compliant programming language, so where does ADO come from? In fact ADO is one of a suite of components, which are known collectively as the Microsoft Data Access Components (MDAC). This sort of components has enjoyed a release schedule that is separate to that of HS/ASP.