

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY  
JNANA SANGAMA, BELAGAVI-590018**



**An Internship Report**

**Online Leave Management Module for  
Centre for Airborne Systems (CABS) Portal**

*Submitted in partial fulfillment for the award of degree of*

**MASTER OF TECHNOLOGY  
in  
COMPUTER SCIENCE AND ENGINEERING**

*Submitted by*

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*Internship Carried Out*

*At*

*Centre for Air Borne Systems (CABS)  
Defence Research and Development Organization (DRDO)  
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2015-16

# VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

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### **CERTIFICATE**

Certified that the Internship work entitled “ **Online Leave Management Module for Centre for Airborne Systems (CABS) Portal**” carried out by **Mr. Premprakash Kashyap**, USN: **1RV14SCS13**, a bonafide student of **R.V. College of Engineering, Bengaluru** in partial fulfillment for the award of **Master of Technology in Computer Science and Engineering** of the **Visvesvaraya Technological University, Belagavi** during the year 2015-2016. It is certified that all corrections/suggestions indicated for internal assessment have been incorporated in the report deposited in the departmental library. The Internship report has been approved as it satisfies the academic requirement in respect of Internship work prescribed for the said degree.

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**Place: Bangalore**

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## **DECLARATION**

I, **Premprakash Kashyap**, student of third semester M.Tech, in the Department of Computer Science and Engineering, R.V. College of Engineering, Bengaluru declare that the Internship entitled “**Online Leave Management Module for CABS Portal**” has been carried out by me and submitted in partial fulfillment of the course requirements for the award of degree in **Master of Technology in Computer Science and Engineering** of **Visvesvaraya Technological University, Belagavi** during the academic year **2015 -2016**. The matter embodied in this report has not been submitted to any other university or institution for the award of any other degree or diploma.

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## **EXECUTIVE SUMMARY**

The online leave management system is designed for all the permanent employee of Centre for Airborne Systems (CABS) DRDO Bengaluru to be able to apply for leave online. The usual pen-paper procedure for the regular employee to apply for leave is going to be overridden by the much efficient online system that will reduce the tedious manual work. The interface is very user-friendly. In this report the workflows requirements essential business rules, GUI etc have been covered to aid the fast and efficient implementation of the online leave module.

The Online Leave Management Module has been developed based on the Model-View-Controller architecture and the spiral model is used for Software Development Life Cycles.

The Online Leave Management System can be entered using a login id and password. Only they can add data into the database. The data can be retrieved easily. The data are well protected for personal use and makes the data processing very fast. This internship has been developed using JAVA language, JSP, Tomcat for application platform, HTML, JavaScript for front end, Java & Servlet for backend with MySql server for database.

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## **CHAPTER 1**

### **ABOUT ORGANIZATION**

The Defence Research and Development Organization (DRDO) is an agency of the Republic of India, in charge for the military's research and development, headquartered in New Delhi, India. It was formed in 1958 by the merger of the Technical Development Establishment and the Directorate of Technical Development and Production with the Defence Science Organization. It is under the administrative control of the Ministry of Defence, Government of India. With a network of 52 laboratories, which are engaged in developing defence technologies covering various fields, like aeronautics, armaments, electronics, land combat engineering, life sciences, materials, missiles and naval systems. DRDO is India's largest and most diverse research organization. The organization includes around 5000 scientists belonging to the Defence Research & Development Service (DRDS) and about 25000 other scientific, technical and supporting personnel.

#### **1.1 Brief History**

Defence Research and Development Organization (DRDO) was established in 1958 by amalgamating the Defence Science Organization and some of the technical development establishments. A separate Department of Defence Research and Development was formed in 1980 which later on administered DRDO and its 50 laboratories/establishments.

Most of the time the Defence Research Development Organization was treated as if it was a vendor and the Army Headquarters or the Air Headquarters was the customers. Because the Army and the Air Force themselves did not have any design or construction responsibility, they tended to treat the designer or Indian industry at par with their corresponding designer in the world market. If they could get a MiG-21 from the world market, they wanted a MiG-21 from DRDO.

DRDO started its first major project in surface-to-air missiles (SAM) known as Project Indigo in 1960s. Indigo was discontinued in later years without achieving full success. Project Indigo led to Project Devil, along with Project Valiant, to develop short-range SAM and ICBM in the 1970s. Project Devil itself led to the later development of the Prithvi missile under the Integrated Guided Missile Development Programme (IGMDP) in

the 1980s. IGMDP was an Indian Ministry of Defence programme between the early 1980s and 2007 for the development of a comprehensive range of missiles, including the Agni missile, Prithvi ballistic missile, Akash missile, Trishul missile and Nag Missile. In 2010, then defence minister A K Antony ordered the restructuring of the Defence Research and Development Organization (DRDO) to give 'a major boost to defence research in the country and to ensure effective participation of the private sector in defence technology'.

The key measures to make DRDO effective in its functioning include the establishment of a Defence Technology Commission with the defence minister as its chairman. The programmes which were largely managed by DRDO have seen considerable success with many of the systems seeing rapid deployment as well as yielding significant technological benefits.

DRDO has achieved many successes since its establishment in developing other major systems and critical technologies such as aircraft avionics, UAVs, small arms, artillery systems, EW Systems, tanks and armored vehicles, sonar systems, command and control systems and missile systems.

### **1.1.1 Vision**

To make India prosperous by establishing world-class science and technology base and provide our Defence Services decisive edge by equipping them with internationally competitive systems and solutions.

### **1.1.2 Mission**

To design, develop and lead to production state-of-the-art sensors, weapon systems, platforms and allied equipment for our Defence Services. To provide technological solutions to the Defence Services to optimize combat effectiveness and to promote well-being of the troops. To develop infrastructure and committed quality manpower and build strong indigenous technology base.

## **1.2 Major Milestones**

**1960:** The DRDO started its first major project in surface-to-air missiles (SAM) known as Project Indigo.

**1962:** The Defence Research and Development Laboratory (DRDL), established one year earlier as an extension of the Special Weapon Development Team (SWDT), is moved to Hyderabad to work on missile design and development.

**February 1988:** India conducts the first test flight of its surface-to-surface Prithvi ballistic missile, under a program headed by the DRDL.

**1989:** India conducts a test launch of its first medium-range ballistic missile, called the Agni. Prime Minister Rajiv Gandhi states "The Agni is an R&D vehicle, not a weapons system. However, the technologies proved in Agni are deeply significant for evolving national security options."

**1995-1996:** India suspends development of the Agni missile project.

**October 1999:** Scientists from the DRDO announce they are developing the Surya, an intercontinental ballistic missile (ICBM) with a range exceeding 5,000 kilometers.

**February 2001:** Dr. Vasudev Aatre, head of India's DRDO and scientific adviser to the Indian Minister of Defence, announces that India is developing the Agni-III intermediate-range ballistic missile (IRBM). The Agni-III is anticipated to have a range of 3,500 km, improving upon the "range and capability" of the 2,100 km-range Agni-II.

**June 2001:** According to the periodical Defense News, India successfully launches the PJ-10, also known as the BrahMos cruise missile, developed by DRDO and Russia's NPO Mashinostroyeniya (NPOM) under a secret 1998 Indo-Russian accord. The missile has a range of 280 kilometers and may be fired from Indian and Russian mobile launchers, ships, submarines and aircraft.

**January 2003:** India has allocated \$1 billion to the DRDO for the development of hypersonic missile systems, powered by an indigenously developed cryogenic engine fueled by liquid hydrogen and liquid oxygen.

**August 2003:** R. N. Agarwal, the former Director of the Agni missile project and currently the Director of the Advanced Systems Laboratory (ASL), states that the carbon

composite content of the new Agni variants will be increased from 35 to 80 percent making them lighter and able travel longer distances. Agarwal says that the Agni's re-entry heat shield is entirely made up of carbon composite.

**October 2003:** India clears the short-range Agni-I and medium-range Agni-II surface-to-surface missiles for the Army.

**December 2003:** Indian Defense sources indicate that the BrahMos cruise missile has been configured for launch from submarines. Submarine-to-surface launch is one of the four BrahMos designs, which are anticipated to include air-to-surface, ship-to-surface, and surface-to-surface. The missile was launched successfully from a surface ship and travelled 290 km to its target.

**February 2005:** President A.P.J. Abdul Kalam states before Parliament that the BrahMos missile "has been successfully tested and is ready for induction" into India's military.

**July 2005:** A joint venture between Russia's Mashinostroenie Scientific Industrial Association and India's DRDO has begun mass production of the BrahMos cruise missile. The Indian Navy has placed the first order for the missile, which is also anticipated to be fielded by the Russian Navy. The baseline version is an anti-ship missile, which also may be fired from air platforms.

**August 2005:** India's Defense Secretary Yogendera Narain states that India has acquired Green Pine radar from Israel for "advanced research," after three to four years of discussions.

**November 2006:** The BrahMos cruise missile is inducted into the Indian Defense forces.

**July 2007:** According to the Calcutta Telegraph, Advanced Systems Laboratories, a DRDO lab, is developing a new cruise missile named the Nirbhay (the fearless). The Nirbhay is expected to have the capability to be launched from land-based, sea-based, and air-based platforms.

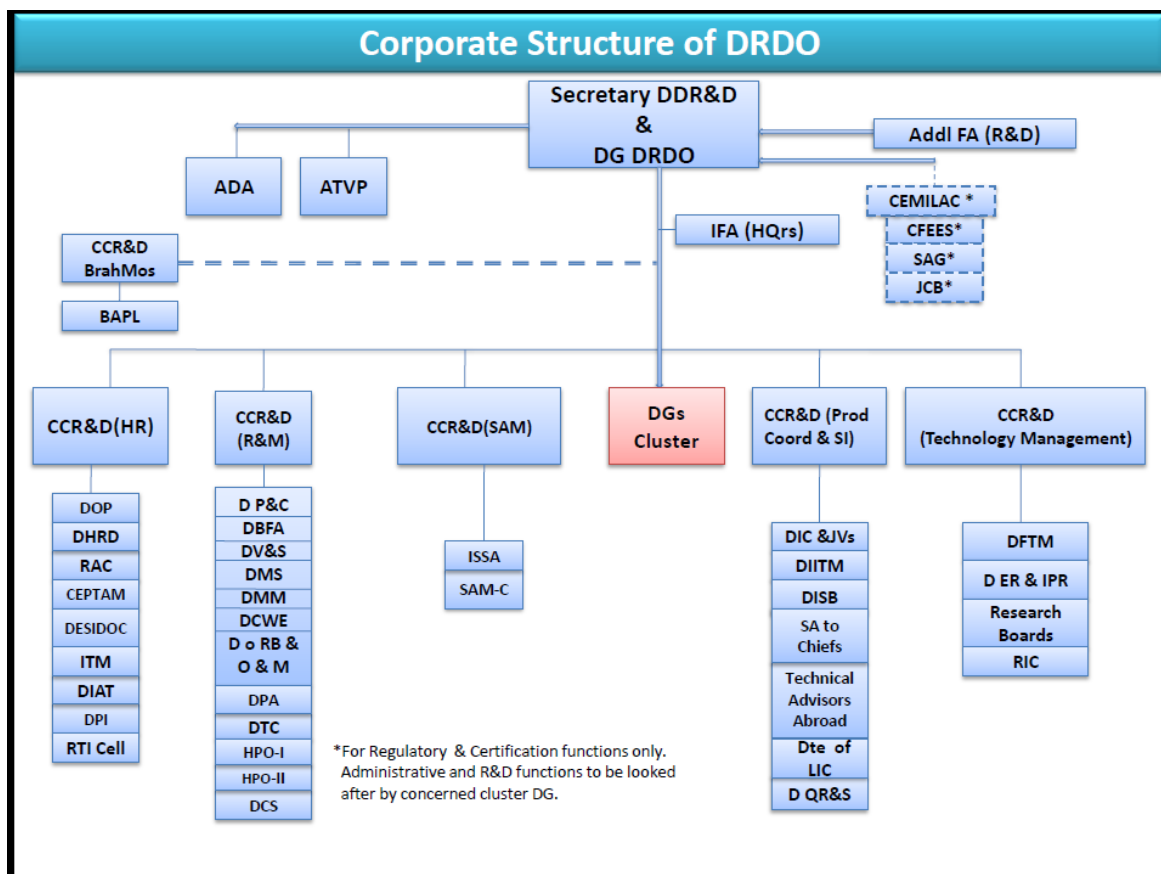
**July 2007:** India reveals that it has successfully tested the Sagarika submarine launched cruise missile (SLCM). According to DRDO sources, the Sagarika has a range of 1,000 km and has been accepted for induction by the Indian navy.

**September 2008:** India and Russia agree to begin joint development of follow-on to the BrahMos cruise missile, the BrahMos-II. The BrahMos- II will be a hypersonic missile able to fly at speeds of over Mach 5.

**August 2010:** The DRDO announces that Russian-built Global Navigation Satellite System (Glonass) receivers have successfully been used to enhance the accuracy of the BrahMos cruise missile.

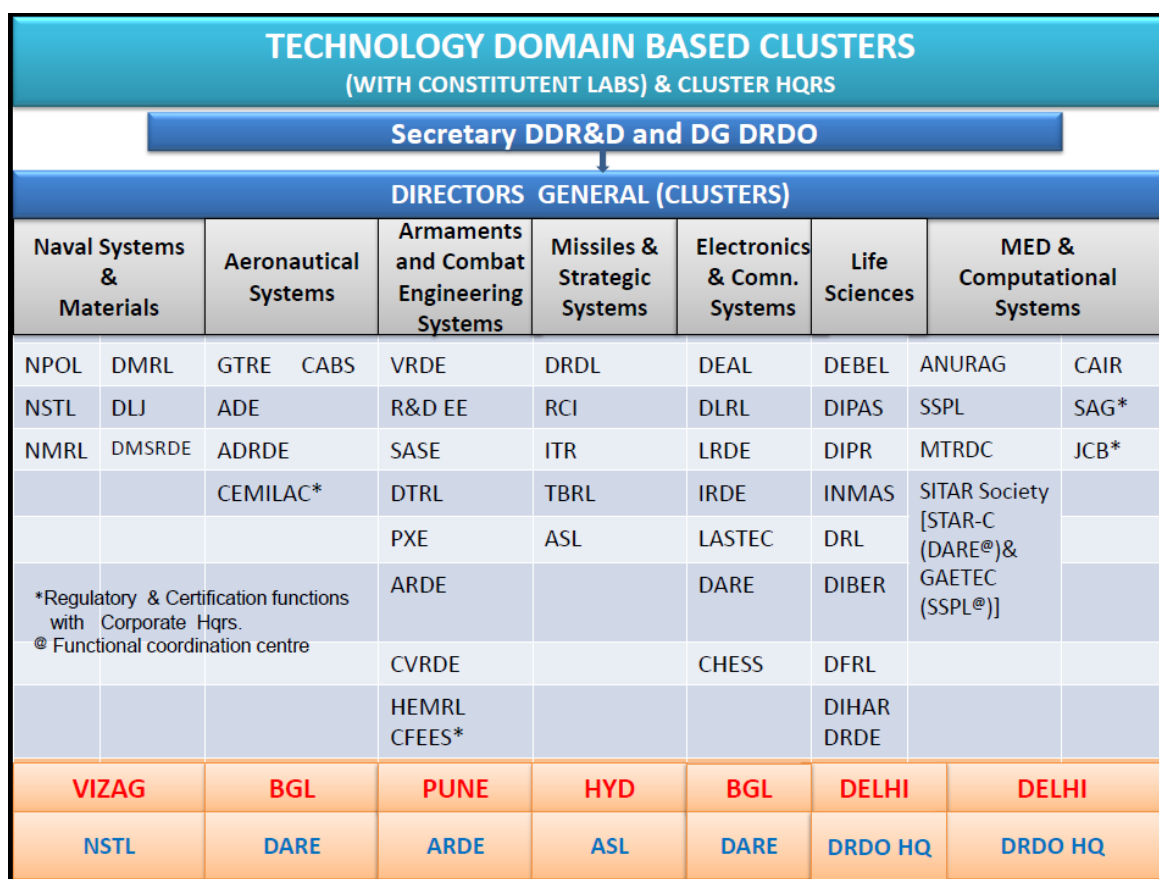
**July 2012:** India conducts an unsuccessful test of the BrahMos cruise missile. This was a developmental test with new components and subsystems produced in India in place of Russian parts.

### 1.3 Overall Organization Structure of DRDO



Source: [www.drdo.gov.in](http://www.drdo.gov.in)

Figure 1.1 Organization Structure of DRDO



Source: www.epicos.com

Figure 1.2 Organization Structure of DRDO

## 1.4 The Products

Table 1.1 the Products of DRDO

S.No.	Systems	Products
1	Missile System	Agni, Prithvi, BrahMos, Dhanush, Trishul, Akash & Nag
2	Naval Systems	HUMSA, USHUS, TAL, Torpedoes-fire control system and Advanced Experimental.
3	Electronic Systems	SARARI, ACCCS, Surveillance Radar, SUMUKTA, SANGRAHA, WLR, SV-2000, CIDSS, CNR and Indra
4	Combat Vehicle and Engg.	MBT, Arjun, Armored, Engg race Vehicle(AERV) Bridge Layer Tank, Armored Amphibious Dozer, SARVATRA, Track way Expedient Mat Ground Surfacing, Armored Ambulance BMP-II,



		Career Mortar Tracked on BMP-II & Operation Theatre Complex on Wheels
5	Aero Systems	LCA, Lakshya Pilotless Aircraft, Nishant UAV "Tempest" EW Suite, Tranquil Reader Warning Receiver (RWR), Tarang RWR Project Verticals, High Accuracy Direction Finding (HADF) RWR, Jagur Mission Computer & Bheema 1000 Aircraft Weapon Loading Trolley
6	Armament Systems	5.56mm INSAS (Amn. LMG & Rifle), Pinaka-Multibarrel Rocket Launcher System, FSAPDS Mk-I/II Ammunition, Influence Mines Mk-I, Multimode Grenade etc.
7	Materials	AB Class Steel for Naval Application, Titanium Sponge, NBC Protective, Clothing/Permeable Suites, Extreme cold weather Clothing systems, Blast Protection Suits, Synthetic Life Jacket, Anti Riot Polycarbonate Shield, Anti Riot Helmet, Brake pads for Aircrafts, Heavy alloy Armour Penetrator Rods, Jackal Armour, Kanchan Armour, Spade M1.
8	Life Sciences Systems	Life Support Systems for Army, Navy and Air force Personnel, NBC Canister, Water Prison Detection Kit, Portable, Decontamination Apparatus, NBC Filters/ventilation systems, First Aid Kit, CW Type A/B, Decontamination kit/solution.

## 1.5 Services offered by the organization

- Design & Development of weapons/systems
- Help in scientific projects undertaken by the Services
- Promoting indigenous production
- Technology transfer of various DRDO developed items
- Work on up-gradation of products
- Facilitate two way exchanges of engineers between DRDO and industry.

## 1.6 Different departments & its functions

**Table 1.2 DRDO laboratories**

DRDO Laboratories	
Aeronautics	ADA, ADE, ADRDE, CABS, CEMILAC, DARE, GTRE
Armaments	ARDE, CFEES, HEMRL, PXE, TBRL
Combat vehicles and engineering	CVRDE, IRDE, R&DE, SASE, VRDE
Electronics and computing	DESIDOC, ANURAG, CAIR, DEAL, DLRL, DTRL, LASTEC, LRDE, MTRDC, SAG, SSPL
Life sciences	DARL, DEBEL, DFRL, DIPR, DIPAS, DRDE, DRL, FRL, INMAS
Materials R&D	DLJ, DMRL, DMSRDE
Missiles	DRDL, ISSA, ITR, RCI
Naval R&D	NPOL, NSTL, NMRL
Micro electronics and devices[MED]	DESIDOC, ANURAG, MTRDC, SSPL
Others	DIAT, ITM

### 1.6.1 Aeronautical Systems

Aeronautical systems are the most technology-intensive systems in the Defence portfolio. DRDO has been involved in the development of aero systems, specifically manned and unmanned aircraft, aero engines, lighter-than-air systems, air-borne surveillance and electronic warfare. R&D in such areas is carried out by a cluster of five laboratories namely

1. Aeronautical Development Agency (ADA), Bengaluru
2. Aeronautical Development Establishment (ADE), Bengaluru
3. Aerial Delivery Research and Development Establishment (ADRDE), Agra
4. Centre for Air Borne Systems (CABS), Bengaluru
5. Gas Turbine Research Establishment (GTRE), Bengaluru

Additionally, design validation and certification of aeronautical stores is carried out by:

1. Centre for Military Airworthiness and Certification (CEMILAC), Bengaluru

### 1.6.2 Armaments

Development of all types of conventional armaments and explosives is undertaken by a cluster of laboratories in DRDO. This cluster also has high degree of self-reliance in a number of areas, viz., ammunitions, high energy materials, fire and environmental safety. The laboratories are

1. Armaments Research and Development Establishment (ARDE), Pune
2. Centre for Fire, Explosives and Environment Safety (CFEES), Delhi
3. High Energy Materials Research Laboratory (HEMRL), Pune
4. Proof and Experimental Establishment (PXE), Chandipur.

### 1.6.3 Combat Vehicles and Engineering

The main objective of this cluster is the management of technology for progressive achievement of self-reliance in the area of Combat Vehicles and Engineering. Hence, the emphasis is given on the development of combat vehicle technology and engineering equipment/systems along with their associate technologies and their productionisation through ToT to the production agencies. In addition, emphasis is on the development of technologies for accurate forecasting and control of avalanches by carrying out scientific studies and experimental work in the field of snow avalanches. The following R&D establishments come under the purview of this cluster

1. Combat Vehicles Research and Development Establishment (CVRDE), Chennai.
2. Defence Terrain Research Laboratory (DTRL), Delhi.
3. Research and Development Establishment (Engineers) [R&DE (E)], Pune.
4. Snow and Avalanche Study Establishment (SASE), Chandigarh.
5. Vehicles Research and Development Establishment (VRDE), Ahmednagar.

### 1.6.4 Electronics and Communication Systems

Electronics and Communication Systems cluster of laboratories is involved in technology development in areas comprising of sensors, instrumentation electronics, control and communication modules and computers, which are the basic building blocks of any modern warfare systems. The cluster consists of the following six laboratories:

1. Defence Avionics Research Establishment (DARE), Bengaluru,
2. Defence Electronics Applications Laboratory (DEAL), Dehradun,
3. Defence Electronics Research Laboratory (DLRL), Hyderabad,

4. Instrumentation Research and Development Establishment (IRDE), Dehradun,
5. Laser Science and Technology Centre (LASTEC), Delhi, and
6. Electronics and Radar Development Establishment (LRDE), Bengaluru.

### 1.6.5 Life Sciences

The cluster of nine laboratories in this domain caters exclusively to the requirements of the personnel behind the weapons. The activities of these laboratories cover a wide spectrum of areas related to health and well-being, protection against extreme and toxic environments, life support systems, and technologies for fresh foods. The life sciences laboratories are:

1. Defence Bioengineering and Electro medical Laboratory (DEBEL), Bengaluru
2. Defence Food Research Laboratory (DFRL), Mysore
3. Defence Institute of Bio-Energy Research (DIBER), Haldwani
4. Defence Institute of High Altitude Research (DIHAR), Leh
5. Defence Institute of Physiology and Allied Sciences (DIPAS), Delhi
6. Defence Institute of Psychological Research (DIPR), Delhi
7. Defence Research and Development Establishment (DRDE), Gwalior
8. Defence Research Laboratory (DRL), Tejpur
9. Institute of Nuclear Medicines and Allied Sciences (INMAS), Delhi

### 1.6.6 Materials

Development of sophisticated weapon systems and products is to a great extent dependent on the basic raw materials and processing techniques. DRDO has a cluster of three laboratories looking exclusively at the materials development of its next generation products. These laboratories provide variety of specialized materials, technologies, and equipment for underwater, surface, and atmospheric uses, e.g., submarines, warships, aircraft and exo-atmospheric missiles. These are:

1. Defence Laboratory (DL), Jodhpur.
2. Defence Metallurgical Research Laboratory (DMRL), Hyderabad.
3. Defence Materials and Stores Research and Development Establishment (DMSRDE), Kanpur.

### **1.6.7 Microelectronics, Devices and Computational Systems**

Recognizing the importance of microelectronics for new generation systems, the MED cluster of DRDO focuses on the development of microelectronic Application Specific Integrated Circuit (ASIC)/System-on-Chip (SoC) for the requirement of electronic sub-systems of major platforms and products. It also deals with the development of information security systems and products required by the Armed forces. The cluster has five laboratories. The laboratories under Microelectronics and Devices are

1. Advanced Numerical Research and Analysis Group (ANURAG), Hyderabad
2. Microwave Tube Research and Development Centre (MTRDC), Bengaluru
3. Solid State Physics Laboratory (SSPL), Delhi

The laboratories under Computational Systems are:

1. Centre for Artificial Intelligence and Robotics (CAIR), Bengaluru
2. Scientific Analysis Group (SAG), Delhi

Additionally, the cluster looks after the activities of Joint Cipher Bureau (JCB), an organization which designs, develops, and produces the codes and cipher for 19 Users including Services and Civil ministries. Approximately, three lakh quantity of crypto material on various media like paper, floppies, compact discs (CDs), Programmable Read Only Memory (PROM), Erasable Programmable Read Only Memory (EPROM), MFG, memory cards and smart cards, etc., have been supplied to different User departments in the current year.

### **1.6.8 Missile Systems**

DRDO has been working assiduously in the development and delivery of strategic and tactical missile systems for the Armed Forces. DRDO has developed a family of missiles ranging from the strategic Prithvi and Agni to the tactical family of Akash—a medium-range air defence SAM, and third generation top-attack anti-tank missile Nag. Ambitious efforts in development of a Ballistic Missile Defence (BMD) programme have resulted in successful interception tests, both in endo- and exoatmospheric modes, making India one of the few elite nations with this cutting-edge technology. Missile development programme has given the country a range of technologies driven by the sheer breadth of platform requirement—from ship- and underwater- launched to ground- and air-launched, which have resulted in a multitude of technologies, viz., re-entry vehicle structure, twin-engine liquid propulsion, stabilization and launch from moving platform, autonomous

navigation, pre-fragmented and submunition warheads, to name a few. The following laboratories are in the missile cluster:

1. Advanced Systems Laboratory (ASL), Hyderabad
2. Centre for High Energy Systems and Sciences (CHESS), Hyderabad
3. Defence Research and Development Laboratory (DRDL), Hyderabad
4. Integrated Test Range (ITR), Chandipur
5. Research Centre Imarat (RCI), Hyderabad
6. Terminal Ballistics Research Laboratory (TBRL), Chandigarh.

Each missile laboratory manages different technologies and projects. For example, DRDL handles technologies like system design, precision fabrication, flight structures, aerodynamics, liquid ramjet and scramjet propulsions, and projects like Akash, LRSAM, Nag, PJ-10, and Astra, etc. RCI tackles technologies like control, guidance, integration, checkout, power supplies, and seeker head, etc., as well as project like MRSAM, Prithvi 1, Prithvi 2, Dhanush, and Air Defence, etc. Similarly, ASL oversees technologies related to solid propulsion, composites and is the nodal laboratory responsible for the developments of long-range surface-to-surface missiles like Agni 1, Agni 2, Agni 3, etc.

### 1.6.9 Naval Systems

The cluster of Naval Systems comprises three laboratories, which are working exclusively for naval applications, keeping in mind the strategic importance of India's maritime boundary. The sphere of activity covers sensors, weapons, and materials for naval applications. The laboratories are:

1. Naval Materials Research Laboratory (NMRL), Ambernath,
2. Naval Physical and Oceanographic Laboratory (NPOL), Kochi,
3. Naval Science and Technological Laboratory (NSTL), Vishakhapatnam.

Path breaking developments have been done by these laboratories in the field. The technologies developed by these laboratories are: first indigenously developed integrated submarine sonar and tactical fire control system Pachendriya; the helicopter sonar system Mihir; state-of-the-art hull-mounted panoramic sonar HUMSA; lightweight torpedo TAL; Processor-based Ground Mine (PBGM); Submarine Fired Decoy (SFD); piezo-composite transducer elements; track-pin bushes of MBT; ceramics for body and vehicle armours; impressed current cathodic protection and various paints technologies for corrosion protection.

## **CHAPTER 2**

### **ABOUT THE DEPARTMENT**

The Centre for Airborne Systems (CABS) is a laboratory of the Defence Research and Development Organization (DRDO) of India. Located in Bengaluru, its primary function is development and evaluation of airborne electronic systems for military applications.

The Centre for Airborne Systems (CABS) is a part of Defence Research & Development Organization (DRDO) Lab and it was formed on 01 Feb 1991 on completion of the below tasks-

- Prepare a Project Definition Report (PDR)
- Initiate work on the lead in schemes to generate necessary database.
- Prepare a statement of case for sanction of full-fledged programme by Cabinet Committee on Political Affairs (CCPA).

CABS essentially acts as a system house and an integration agency, utilizing all available infrastructure and expertise in the country for the development of electronic force multiplier technology focusing attention on AEW and Airborne Warning and Control System (AWACS) related technologies.

The centre acted as a nodal agency to carry out the development of indigenous AEW technology demonstrator, called Airborne Surveillance Platform (ASP) on a modified HS-748 aircraft. Subsequent to the short-closure of the ASP programme, the charter of duties of CABS was revised and re-oriented with a view to gainfully utilize the competence, expertise and infrastructure built up during the development of the ASP.

The IAF and DRDO have jointly agreed that there is a necessity to develop an indigenous Airborne Early warning and Control (AEW&C) System, configured on a regional jet class of aircraft utilizing the expertise developed by DRDO. A CAB was identified as the nodal agency for carrying out this task, based on the expertise gained

through the ASP programme. Subsequently the AEW&C Programme has been sanctioned to CABS in Oct 04.

When the ASP activity shifted from Delhi to Bengaluru, the Centre for Airborne Systems, by then known by its acronym, CABS, accommodated itself in the premises of the Aeronautical Development Establishment in Jeevan Bheema Nagar. CABS then systematically began building up its own facilities in the sprawling grounds on the southern side of the HAL airport as per plans for its perceived long term goals.

### **VISION**

Meet Technological Challenges of Airborne Surveillance Systems.

### **MISSION**

Develop key technologies and Infrastructure for building efficient and cost-effective indigenous Airborne Surveillance Systems.

### **QUALITY POLICY**

"Centre for Airborne Systems is committed to design and develop Airborne Force Multipliers in cost effective ways to meet user requirements and continuously improve the systems / products through an efficient quality management system".

## **2.1 Specific functions performed by the department**

1. Design and Development of Airborne Surveillance System
  - a. Aircraft structural modifications for mounting of systems.
  - b. System Integration including High Level Design, Avionics Integration and Thermal Management.
  - c. Flight test planning and evaluation of indigenous systems.
2. Infrastructure
  - a. Lightning Test Facility.
  - b. GPS Simulator.
  - c. Anechoic Chambers.
  - d. Thermal Rig.
  - e. Ground Rigs.



- f. Vector and Pulsed Network Analyzers.
  - g. Vx-Works Integrated Software Development Environment.
  - h. Simulation Tools (Catia, Mat lab, Flow herm, Lab view).
  - i. Tools for Visualization and Ergonomics.
  - j. Radar Target/Scenario Generators.
  - k. Product Lifecycle Management (PLM).
3. Integration and Flight Testing of Mission Systems on Airborne Platforms
- a. LCA Multi-Mode Radar on Hack Aircraft.
  - b. Missile Approach Warning System on Hack HS-748.
4. Microwave Technologies
- a. Ultra low Side-Lobe Antennae and Phased Arrays.
  - b. TR Modules and Microwave Super Components.
  - c. Identification Friend or Foe.
  - d. Transmitters, receivers, interrogators.
5. Analytical Capabilities
- a. CFD Analysis.
  - b. Thermal Analysis.
  - c. Sensor Co-location studies.
  - d. Structural Analysis.
  - e. RF System/ subsystem analysis.
6. Design & Development of specialized software
- a. Data Handling and Display Systems.
  - b. Command and Control Systems.
  - c. Intercept Control and Guidance System.
  - d. Communication Control Systems.
  - e. Data Compression and Management.
  - f. Multi Sensor Data Fusion (MSDF).
  - g. GUI for Airborne Surveillance System.
  - h. Active Antenna calibration & evaluation.
  - i. Customization of PLM.
  - j. IFF signal & reply processing.
7. Design and Development of Specialized Subsystems
- a. Airborne Active & Passive Electronically Scanned Antennae Systems.
  - b. GPS and Navigation equipment.

- c. Lightning protection scheme and evaluation.
- d. Mission Computers.
- e. Airborne Consoles.
- f. IFF Interrogators.

## **2.2 On-going Research Work**

- a) Indian AEW & C System
- b) Primary Surveillance Radar
- c) Secondary Surveillance Radar
- d) Mission Communications System
- e) ESM & CSM
- f) Self Protection System
- g) Mission System Controller
- h) Data Handling and Displaying System
- i) PLM for Effective Programme Management
- j) Independent Verification and Validation

### **2.2.1 EMB 145 AEW&C project**

Embraer and the Indian Government have signed a deal for three Embraer 145 AEW&C (Airborne Early Warning & Control) jets. The contract includes a comprehensive logistics package comprising training, technical support, spare parts, and ground support equipment.

The ERJ 145 platform, currently being used on Intelligence, Surveillance and Reconnaissance (ISR) missions in Brazil, Mexico and Greece, will join the AEW&C programme under the responsibility of India's Defence Research & Development Organization (DRDO).

On 17 August 2012, India received the first Embraer 145 Airborne Early Warning and Control Aircraft, built with Indian technology. It is claimed as a major breakthrough in mounting an electronic eye in the sky for India.

The aircraft is fitted with Indian airborne Active Electronically Scanned Array (AESA) radar, giving it the capability to detect missiles and hostile fighters at all angles. Programme Director, Christopher was quoted by the media as saying, "The new EMB 145 would have airborne Active Electronic Scanned Array (AESA) radar designed by DRDO's Bengaluru-based Centre for Airborne Systems (CABS). DRDO will integrate other mission systems in India and deliver the aircraft to the Indian Air Force".

Dr Elangovan, Chief Controller Research & Development of DRDO, said the aircraft was upgraded to have major capabilities such as "in-flight refueling system, significant increase in electric and cooling capacity and a comprehensive set of structural changes to allow installation of advanced mission systems."

### **2.2.2 Material & Processes adopted**

#### **➤ Smart Materials and Smart Structures**

##### **❖ Smart Antenna**

Magnetostriction (the tendency of certain materials to strain in the presence of a magnetic field) has been the subject of recent actuator design studies for smart structure application. CABS carried out a study to investigate feasibility of using a smart magnetostrictive material, Terfenol-D, as a potential actuator technology for advanced antenna orientation control system. As a step towards this goal, a single degree of freedom antenna model was designed to demonstrate the pointing accuracy attainable in pitching movement. A 100mm long Terfenol D actuator was designed and characterized. A smart antenna model was designed that would provide 2.5 deg deflection of antenna. The experimental work established that the antenna orientation control to a high level of precision would be possible by using Terfenol-D actuator. This concept can be adapted for any other actuation and control system. Such a smart actuator technology has the promise to overcome the size, weight and complexity issues of conventional actuators.

##### **❖ Magnetostrictive Pump**

Conventional pumps and their associated structure are heavy or bulky to the amount of work to be performed. Since their technology had already matured, any fine tuning improvements in the field is also not expected to meet the emerging very high power

requirements. Hence researches are focusing their attention to develop high power pumps by exploiting new materials, called smart/adaptive material. The objective of the present study is to design and develop a positive displacement pump that utilizes magnetostrictive actuation to replace existing pulsating pump.

### **2.2.3 Testing**

The Centre for Airborne Systems (CABS) is mandated to develop the Airborne Early Warning & Control (AEW&C) System for use by IAF and other Defence services, along with all related systems, sub-systems & technologies which amongst others includes the design and development of the Primary Radar (PR) including the Active Antenna Array Unit (AAAU) for Airborne Electronically Scanned Array (AESA) Radar, Secondary Surveillance Radar (SSR)/Identification Friend & Foe (IFF) Systems, Electronics Support Measure (ESM), Communication Support Measures (CSM), Self Protection Suite (SPS), Data Handling & Display System (DHDS) , Mission System Controller (MSC), Mission Communication System (MCS) etc. and also look into all aspects of integration on board a suitably modified Platform.

Towards this, CABS has developed core competencies in design and development of Airborne Surveillance Systems including carrying out structural modification of aircraft for mounting of systems, integration & flight testing of Mission Systems on Airborne platforms, microwave technologies, design and development of specialized sub-system and software.

The scientists at the centre have also gathered immense analytical capabilities in the associated systems, sub-systems & related technologies. The Scientists have also been extensively involved in the creation of specialized facilities such as the Lightning Test Facility (LTF), Anechoic Chamber with Planar Near Field Measurement (PNFM) Facility, HALT-HASS Chamber, System Test & Integration Facility, EMI/EMC Test Facility etc. The Scientists at the Centre have also carried out the design & development of essential Ground Support Equipments for the successful operation of the AEW&C System which include the Mission Planning and Analysis Station (MIPAS), Ground Exploitation System (GES), Operator Training Station (OTS), Mission Software Support Facility (MSSF) etc.

From the Programme Management aspect, one feature of the AEW&C development is the powerful Programme Office (PO)-Work centre (WC) networking. The task of the Programme Office (PO) is the management of the whole network and the coordination of cooperative effort in delivering the AEW&C System in time, within budget, to scope and that delivers operational benefits.

Complex products such as the AEW&C require the collaboration of large specialist networks which are extensive & scattered and management of these is not easy. This requires efficient & effective data management through a controlled & traceable Product Development Environment. Keeping these aspects in mind, PO took up a pioneering effort in implementing the Product Lifecycle Management (PLM) for AEW&C Programme.

### **2.3 Products**

CABS provide Lightning Test Facilities (LTF) and protection schemes to several civil industries. Fiber optic cables of telecom service providers and tested and qualified for lightning. Civil electronic, automotive firms also utilize these services. Towards these CABS has established a national LTF capable of 4MV high voltage and 200 KA high current tests.

CABS have indoor far-field antennae measurement facility for radiation pattern measurement from 1 GHz to 18 GHz. Also Planar Near Field Measurement (PNFM) facility available at CABS.

Secondary Surveillance Radar (SSR) and Antennae developed at CABS can be tailor made to Civil ATC. The transponder developed can be used for civil aircrafts.

### **2.4 Facilities Available**

- a) System Test & Integration Rig (STIR)
- b) Antenna Integration & Test Rig
- c) Anechoic Chamber with Planar Near Field Measurement (PNFM) Setup
- d) EMI/EMC Test Facility
- e) Individual Test Rigs for the Sub-Systems

- f) Ground Test Rig
- g) Lightning Test Facility (LTF)
- h) HALT-HASS Chambers
- i) Flight Test Bed Facility
- j) Simulation Facility

### **2.5 Role & Responsibility of individual in the department**

I am working in CABS DRDO as a Project Trainee and my responsibilities are to design and develop the leave module.

For any organization the people over there or the employees are the most useful and powerful assets. Without the employees no organization can work smoothly. But if the organization is not having the well organized team in which the employees work with the coordination with other employees, to be successful is hard to achieve.

In an organization both the terms individualism and team work exists. If the terms are well understood by the people in the company it will work as a great boon otherwise will lead to failure of the organization.

Individualism means the person owes a right to think independently and then act accordingly. The personal success and happiness is a powerful motivation to work effectively in the team. Whatever the individual does he gets the credit for that. It is very easy to concentrate on the matters which are good things to build focus. The individual is in charge of his goals and decide what to do and when to do.

On the other hand team work has its own advantage. People who are able to work with a group of people in a team tend to communicate well with others. Teamwork provides workers a cooperative, enjoyable and friendly work environment. The team can also be helpful in responding to worker's problems and questions, therefore increases the work efficiency.

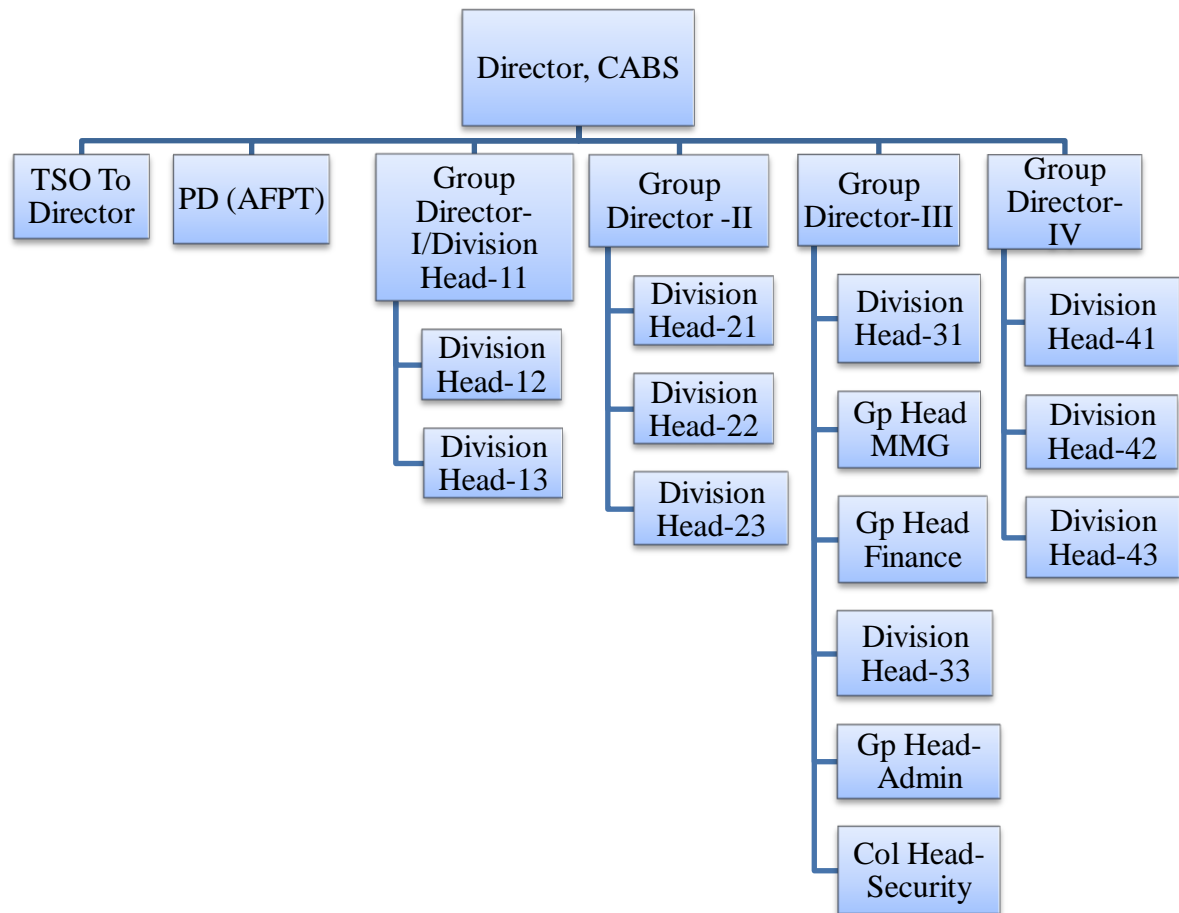
One of the main benefits team environments is the ability to share ideas among the group. Two heads are better than one: one person's knowledge and abilities are limited; it

could be hard for us to deal with difficult problems without others' help. On the other side, every individual is different and has unique qualities.

Individuals with different experiences and backgrounds increase the creativity of individual team members and the group as a whole. When members apply different skills they are often able to come up with a more effective solution than one person working on the same problem. Teamwork also plays a key role in improving relations among the employees.

So, it is important to know the significance of both individual and the team work. So it also depends on the employee over there to make effort to understand the pros and cons of both and use them according to the situation. Team work can be more effective than individual work if the team is cooperative and well managed. It stands to reason that the work of a team of people would serve to accomplish more than work performed by only one person.

## 2.6 Organization Structure of the Department



Source: [www.cabs.org](http://www.cabs.org)

Figure.2.1 Organization Structure of the Department



## **CHAPTER 3**

### **TASK PERFORMED**

#### **3.1 Technical & non technical activity performed**

The Internship task assigned involves both technical and non technical activities. The process of Requirements gathering includes interaction with various department heads, gathering inputs from officers in various cadres, followed by drafting of the requirements and consolidating the requirements.

The details of the activities performed are described below:-

##### **3.1.1 Requirement Gathering**

Various interaction meetings with senior scientists and Administration departments at CABS were conducted and the consolidated requirements related to Leave Management module are given below.

###### **❖ Functional Requirement**

- a) All the user should be able to apply their leave online.
- b) All the user should be able to manage (modify/cancel) their leave online.
- c) Leave approval process (Recommendation, Forward and Sanction).
- d) Admin should be able to manage master data (Update Calendar, View Leave Report, View Leave History & Leave Status, and Update Half year Leaves).
- e) System should be able to generate configurable dynamic report.

###### **❖ Software Requirement**

- a) The software should be robust, dynamic and compact server side web application.
- b) Layered architecture of the software will be preferred.
- c) It is preferable to use Java language, Tomcat for application platform, HTML, JavaScript for front end, java & j2ee for backend with MySql server for database.

### 3.1.2 BUSINESS RULES

- a) If a person is Group Head, their leave goes directly to Director for sanction.
- b) Director's application is considered and only for information to Admin section.
- c) Every recommendation and Sanction screen must have option to approve/not approve.
- d) Recommending and Sanction authority should be provided option to give their comments.
- e) Late leave must be applied immediately on the day of joining. Otherwise other than CL, no other late leave should be allowed to apply if there is delay of more than one day.
- f) For any leave, applicant must provide leave address.

### 3.1.3 Types of Leaves

**Table 3.1 Leave Types**

CL (Casual Leave).	SCL (Special Casual Leave).
EL (Earned Leave).	SDL (Special Disability Leave).
HPL (Half Pay Leave).	LND (Leave Not Due).
CML (Commutated Leave).	CAL (Child Adoption Leave).
ML (Maternity Leave).	HL (Hospital Leave).
CCL (Child Care Leave).	SL (Study Leave).
PLA (Paternity Leave Adoption).	LPR (Leave Preparatory to Retirement).
EOL (Extra Ordinary Leave).	

#### 1. Casual Leave (CL)

- a) Casual leave (CL) should not be granted more than 5 days at any one time except under special circumstances.
- b) 8 days CL is credited on 1<sup>st</sup> January.
- c) Sunday/Closed Holidays/Public Holidays/RH which precede a period of casual leave or come at the end may be prefixed or suffixed to such leave.
- d) LTC can be availed while on CL.

#### 2. Earned Leave (EL)

- a) Earned leave shall be credited 2.5 days per month for each completed calendar month from the date of joining.
- b) 15 days EL is credited on each 1<sup>st</sup> January and 1<sup>st</sup> July every year.

- c) Total Accumulated EL should not exceed 300 days.
- d) EL can be availed 180 days at any one time.
- e) EL can be availed 300 days in case of Leave Preparatory to Retirement.

### **3. Half Pay Leave (HPL)**

- a) HPL shall be credited 5/3 days per month for each completed calendar month from the date of joining.
- b) 10 days HPL is credited on each 1<sup>st</sup> January and 1<sup>st</sup> July every year.

### **4. Commuted Leave (CML)**

- a) With Medical Certificate – Up to ½ of HPL due.
- b) Without Medical Certificate
  - a. Up to 90 days for approved course.
  - b. Up to 60 days for female employee in continuation to maternity leave.
  - c. Up to 60 days for female employee having less than 2 children, on adoption of child less than 1 year.
  - d. In continuation of CCL, up to maximum of 60 days to female employee.
- c) For each commuted leave, 2 leaves will be debited from HPL.

### **5. Leave Not Due (LND)**

- a) Only for permanent employees.
- b) For temporary employees in special cases with minimum 1 year of service in case of major illness.
- c) Granted only when no HPL is pending.
- d) Should be limited to HPL.
- e) Maximum of 360 days in the entire service.
- f) Debited to the HPL account of the employee.
- g) Salary will be half the amount for salary during EL.
- h) If an employee resigns/retires on LND, his LND will be cancelled and salary paid will be recovered.
- i) If an employee resigns/retires just after LND, salary paid during LND will be recovered.
- j) If the employee retires due to ill health/compulsorily retire prematurely/dies, his salary paid during LND will not be recovered.

### **6. Extra Ordinary Leave (EOL)**

- a) Granted when no other leave is allowed.
- b) Employee requests in writing.
- c) Not granted during notice period in case of voluntary retirement.
- d) Can be granted to apprentices also.
- e) 3 months with or without medical certificate.
- f) 6 months - Against medical bills after 1 year service.
- g) 18 months - in case of major illness after 1 year service.
- h) 24 months - For higher studies after 3 years service. This can be extended if employee is ready to work for 3 years after returning.
- i) For SC/ST employees – No limit – for attending pre-examination training course at a notified centre.
- j) 2 spells of EOL intervened with any other leave will be considered as 1 leave for the entire period.
- k) No leave salary.

### **7. Maternity Leave (ML)**

- a) Maternity leave – 180 days from the date of its commencement.
- b) Maternity leave can be combined with any other kind of leave.
- c) Maternity leave shall not be debited against the leave account.

### **8. Child Care Leave (CCL)**

- a) CCL may be granted for a maximum period of 730 days during the entire service.
- b) CCL shall not be admissible if the child is eighteen years of age or older.
- c) In case of disabled children CCL can be allowed up to the age of 22 years of the child.
- d) CCL shall not be debited against the leave account.
- e) CCL can be combined with any other kind of leave.
- f) CCL may not be granted in more than 3 spells in a calendar year.
- g) CCL can be granted for a period of less than 15 days at a time.
- h) LTC cannot be availed during CCL.

### **9. Paternity Leave (PL)**

- a) Male employees only.

- b) With less than 2 surviving children.
- c) Up to 15 days before and up to 6 months from date of delivery.
- d) After this, it will be lapsed.
- e) In case of adoption, up to 6 months.
- f) Can be combined with all kind of leaves.
- g) Salary same as last drawn salary.

### **10. Child Adoption Leave (CAL)**

- a) Allowed if less than 2 surviving children.
- b) Child less than 1 year is adopted.
- c) Entitled for 180 days.
- d) This leave can be clubbed with any other leave till the child is 1 year or for 1 year whichever is earlier.
- e) Even leave not due and commuted leave up to 60 days without medical certificate.

### **11. Hospital Leave (HL)**

- a) Hospital leave may be combined with any other kind of leave but should not exceed 28 months.

### **12. Study Leave (SL)**

- a) After 5 years of continuous service.
- b) Not for probationary employees.
- c) Max 12 months at a time.
- d) Max 24 months during entire career.
- e) Max 36 months for Central Health Service Officers for PG course provided they give 5 year bond.
- f) Can be combined with other leaves.
- g) Total leave should not exceed 28 months for general.
- h) Total leave is not exceeding 36 months for PhD courses.
- i) Study leave is not debited to any other leave.
- j) For study outside India.
- k) Pay last drawn + DA + HRA (No Study Allowance).
- l) HRA.
- m) Paid for 180 days and rest on production of certificates.

- n) Not entitled for TA or cost of fees for study (Allowed in special circumstances).
- o) If the employee fails to return after the study leave or quits within 3 years, study leave salary will have to be refunded with interest.
- p) The president can waive this in exceptional cases.

### **13. Special Casual Leave (SCL)**

SCL has various categories and varying leaves as below:

- a) Sports
  - a. Maximum of 30 days in a calendar year for national / international / mountaineering / trekking expeditions.
  - b. Maximum of 10 days for inter ministerial / inter department sports / tournaments.
- b) Cultural Activities
  - a. Maximum of 30 days in a calendar year for cultural activities in India / state level events.
  - b. Maximum of 15 days in a calendar year for participating in dancing / singing competitions.
- c) Family Planning
  - a. Male Employees
    - i. Up to 5 days for vasectomy.
    - ii. Up to 3 days after wife's tubectomy, laparoscopy or salpingectomy.
  - b. Female Employees
    - i. Up to 10 days for tubectomy, laparoscopy or salpingectomy (maximum of 2 times, needs a MC).
    - ii. Entire duration if post tubectomy employee is not fit for duty but not hospitalized (commuted leave can be given).
    - iii. 1 day on day of husband's vasectomy.
  - c. Up to 21 days for recanalization operation.
- d) Re-Employed Ex-Servicemen
  - a. Up to 15 days.
- e) Employee Union and Association Activities
  - a. Up to 20 days to union / association officer bearers for their activities.
  - b. Up to 10 days to outstation delegates / members.
  - c. Up to 5 days to local delegates / members.

- d. Up to 10 days to leaders of staff side of JCM.
- e. 1 day leave for staff side members to attend JCM meetings.
- f) Natural Calamities, Bandh etc
  - a. For the no of days of bandh if employees stay more than 3 mile from office.
  - b. For the no of days of bandh due to picketing, disturbance and curfew.
- g) Cooperative Society
  - a. Up to 10 days for meetings / works connected with Cooperative Society.
- h) Kendriya Sachivalaya Hindi Parishad
  - a. Up to 20 days in a year for participating in activities.
- i) Elections
  - a. 1 day on day of election.
- j) Differently Abled Employees
  - a. Up to 10 days for participating in differently abled seminars, etc.
  - b. Up to 4 days for special requirements related to disability.
- k) Misc
  - a. Up to 14 days for time spent in camps for Urban unit of territorial arm.
  - b. Up to 14 days for participating in Republic day parade as member of lok sahayak sena.
  - c. 1 day on day of donating blood to recognized blood banks.
  - d. For attending courts as jurors and assessors.
  - e. Up to 6 days for attending IIPA meetings.

### 14. Special Disability Leave (SDL)

- a) In case of disability due to injury, without 3 months of injury which can be relaxed by sanctioning authority.

### 3.1.4 Levels & Roles

**Table 3.2 Levels & Roles**

Level 0	Level 1	Level 2	Level 3
User, Admin Officer	DH	DH	Admin
DH	GD	Director	Admin
GD	Director	Director	Admin
Director	-	-	Admin

### **A. DH (Division Head)**

- a) DH should be able to see his division's records.
- b) DH can't view his/her GD's leave report or history.
- c) DH generally does the job of recommendation of leave forms.
- d) CCLs are recommended & sanctioned by the DH.
- e) For non-gazetted officer such as STAs, technicians, admin assistants, Hindi attendants, accountants, DEOs the EL for up to 10 days is recommended & sanctioned by the DH & then forwarded to the admin officer for these employees the EL for more 10 days is recommended by the DH, sanctioned by the GD and then forwarded to the admin officer.

### **B. GD (Group Director)**

- a) If a person is Group Head, his/her leave goes directly to director for sanction.
- b) GD should be able to see his group record.
- c) For STAs, technicians, admin assistant, store assistant, vehicle operators, security attendants, Hindi attendants, accountants, DEOs the EL for up to 10 days is recommended & sanctioned by the DH and then forwarded to the admin officer. For these employees the EL for more than 10 days is recommended by the DH, sanctioned by the GD and then forwarded to the Admin Officer.

### **C. Director**

- a) Director's application is considered sanctioned and only for information to Admin section.
- b) Director should be able to see every body's leave records.

### **D. Admin Officer**

- a) Admin officer can view his/her GD's/DH's report.
- b) Only Administrator & his/her authorized rep can maintain the database.
- c) Administrator has to update & generate the user leave reports.
- d) Administrator has to update the calendar.
- e) Administrator has to publish the list of closed & restricted holidays.
- f) Administrator has to take care of the leave encashment during LTC and notify it to accounts for further action.
- g) To generate various reports regularly for Director.



- h) Administrator must be able to generate leave reports of people for a certain period.
- i) User has to upload medical certificates/birth certificates if they are submitted on the next working day after the leave. In case of late submission of the documents, user has to give proper explanation to the admin officer. Admin officer then uploads these documents.

### **E. Service Personnel**

- a) Service employees can't apply for leave in this module. Their leave management is handled separately.
- b) In this leave module any service personnel who is a DH or GD etc., can view the leave report of his/her division/group, recommend or sanction leaves according to the authority given.

### **3.1.5 Reasons for leave**

- a) Personal.
- b) LTC (Leave Travel Concession).
- c) To attend family function.
- d) Paternity leave.
- e) Maternity leave.
- f) Medical leave.
- g) To take care of children during their exams.
- h) To take care of ailing child/children.
- i) Going out of station.
- j) Going abroad.
- k) Study leave.

### **3.1.6 Reasons for late leave**

- a) Personal.
- b) Medical leave.
- c) Leave extension.

### **3.2 Task assigned**

- a) Leave application by users.
- b) Modification of leave by users - leave type or duration within allowed period.
- c) Cancellation of leave by users – within allowed period.
- d) Recommendation, Forwarding and Sanctioning of user leave application.
- e) Leave application on behalf of individual by admin.
- f) Leave balance updating by admin.
- g) Half yearly leave updating.
- h) Generating reports – of leave history and leave balance.
- i) Uploading holiday list every year.
- j) Uploading restricted holiday list every year.
- k) Uploading list of working Sundays.

### **3.3 Technical & non-technical skill used to perform assigned task**

I designed different types of leave form for applying the leave by user. I used Java Server Page, Java Script and HTML for front end design for user interface. For back end I used Java Servlet and J2EE. To storing the data I used MySql database.

This section will explore the different aspects concerned with the implementation of the developed system. This project was concerned with the development and implementation of the leave management system.

The developed system encompasses various activities associated with managing employee information.

The main functionalities available in this system are:

- Types of leave
- Start date & end date
- Reason
- Comments
- Leave Address, if long leave
- Handling over duty info, if long leave
- Permission, if going out of station
- Date of recommendation and the authority.

The leave balance at the time of application and at the time of sanction is maintained. Only admin Dept Head and his / her authorized rep can update the database. The information about who updated which data is also maintained with the date information.

If leave pertaining to next year or previous year is applied in this year, it handles accordingly:-

- Eg. If an individual applies CL for 30 & 31-Dec-2013 on 2-Jan-2014, then CL is allowed if balance is available in previous year's i.e. 2013's balance and on sanction, it is deducted also from 2013 balance and not from 2014 balance.
- Similarly if the same EL is applied in the same way then
  - If the balance was made > 300 on 31-Dec-2013 then balance is reduced by the number of days of leave after sanction in 2013. The leave balance of 2014 is also change accordingly.
  - If the balance was <300 on Jan 1, 2014 then balance is reduced by the number of days of leave after sanction.

Reason for leave application, cancellation or modification is picked from standard set of reasons. Leave encashment during LTC: Provision is made to admin to apply it on the user's behalf. This does not require the start and end date, only number of days and the half year that it pertains to.

Uploading of sickness & fitness certificate by user, Leave like EL, CL, SL etc. requires publishing in DO part. Admin have the provision to update the DO Part # and date corresponding to a particular leave. Similarly for the cancellation and modification of these leaves.

CL, EL, RH etc are recommended and sanctioned by the concerned authorities. CML, ML, Paternity and maternity leave after recommendation go through Admin officer before going for sanction to the Director. If a person is division/group head, their leave goes directly to Director for sanction without going through recommendation.

Director's application is considered sanctioned and only for information to Admin section. Every recommendation and sanction screen has option to approve/ not approve / see later. Recommending and sanctioning authority is provided option to give their comments.

A leave not approved by any authority is goes to Director's account and he sanctions it. When duty is handed over, the person who has taken over is handles the leave of people of that group during that period only.

Late leave is applied immediately on the day of joining. Otherwise other than CL, no other late leaves allowed to apply if there is delay of more than 1 day. A person going to long leave is hand over duties to next person.

Leave application ensures that if leave is more than 3 days, handing over is requested by the applicant. For long leave, applicant provides leave address. Admin gives option to handle 'handing over' with date and responsibility of handed over information.

User can combine the following leave types with the other types of leave:

- User can combine CL with RH leave type.
- User can also be able to combine CML with all types of leave except CL.
- User can combine ML with all types of leave except CL.
- User can combine PL with all types of leave except CL.
- User can combine SL with all other types of leave.
- User can combine HL with all other types of leave.
- User can combine CCL with all the types of leave except CL.
- User can combine SCL with all the other types of leave.

User can see all the available holiday list, RH list and leave balance while applying. User can see only his leave records – including progressive leave balances etc. A group head can see his people's record. Director can view everybody's leave record.

Admin can generate reports of people on leave in a certain period, leave sanctioned in a certain period, leave cancellation and modified in a certain period etc. Record of leave application, cancellation, modification etc, is maintained with the dates of approval etc.

Report of already availed leave reflect the person's name, title, designation and division as in that period when leave was availed and not the date on which the report is seen.

The online leave management system is designed for all the permanent employee of Centre for Airborne Systems (CABS) DRDO Bengaluru to be able to apply for leave online. The usual pen-paper procedure for the regular employee to apply for leave is going to be overridden by the much efficient online system that will reduce the tedious manual work. The interface is very user-friendly.

The Online Leave Management System enters using a login id and password. It is accessible by permanent employees of CABS DRDO Bengaluru. Only they can add data into the database. The data can be retrieved easily. The data are well protected for personal use and makes the data processing very fast.

The figure 3.1 shows the general workflow diagram for Applying for leave. The permanent employee applies their leave by logs in the portal with valid user id and the password.

The figure 3.2 shows the general workflow diagram for cancellation of leave. User cancels their leave at any stage.

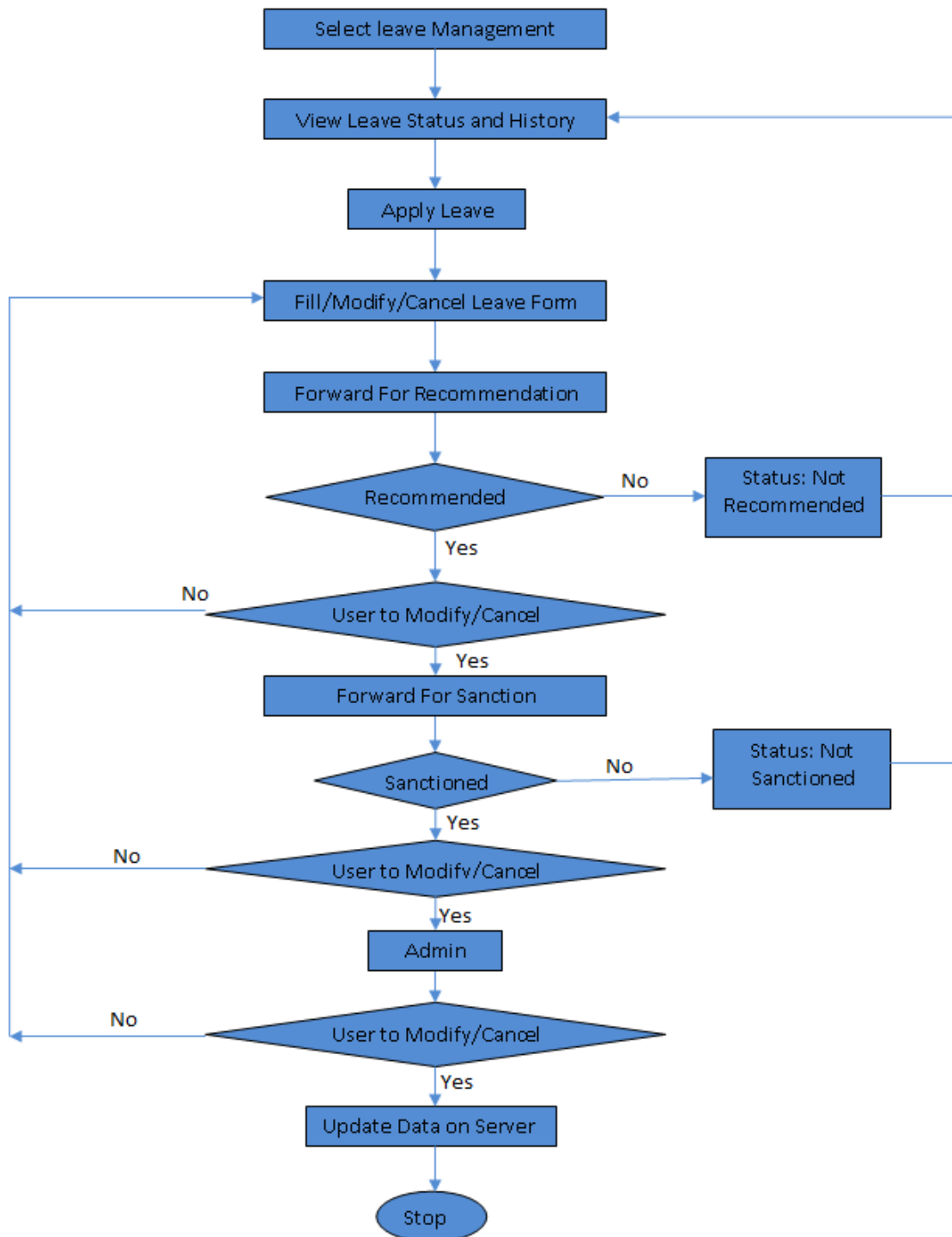


Fig.3.1 General Workflow Diagram for Applying Leave

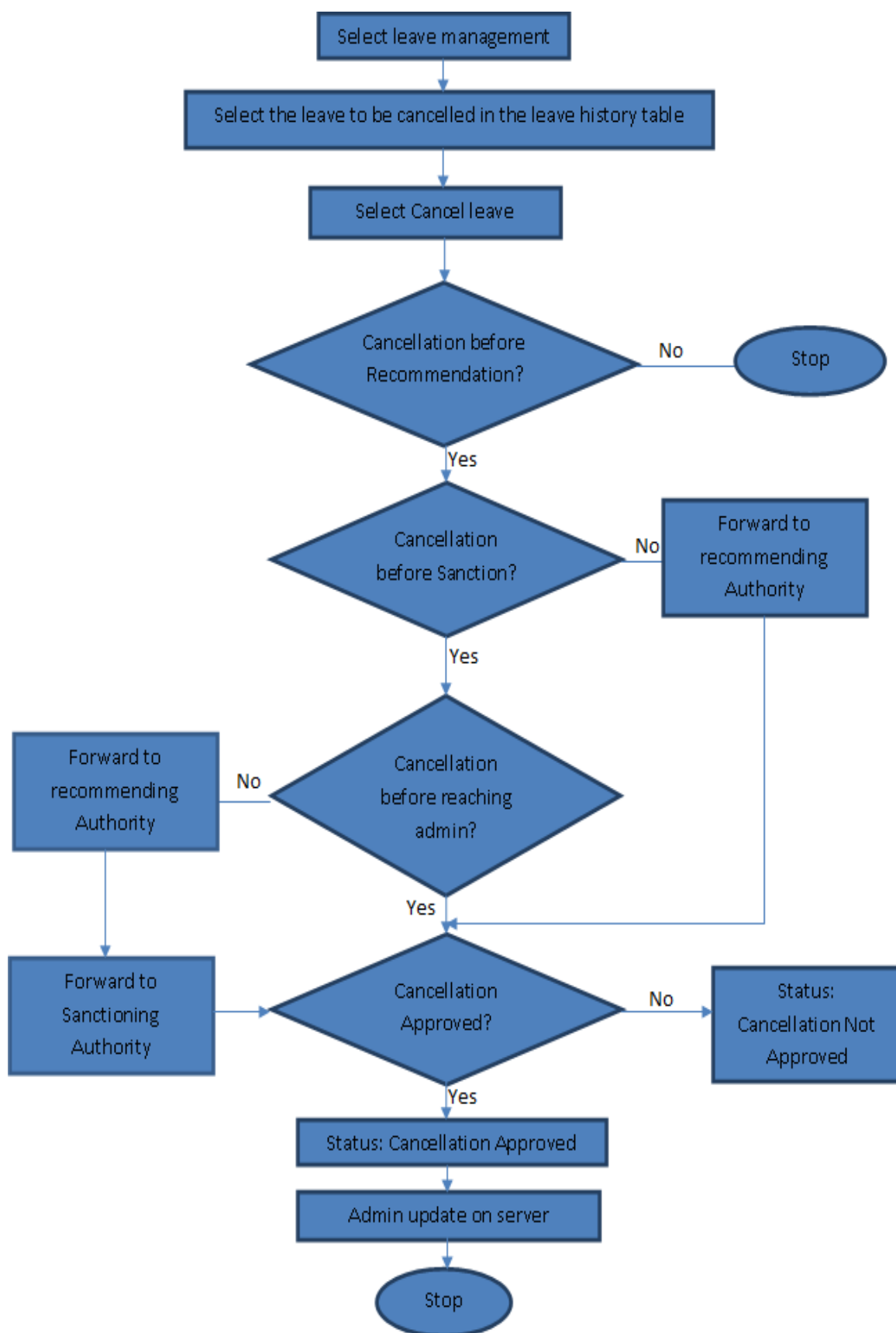
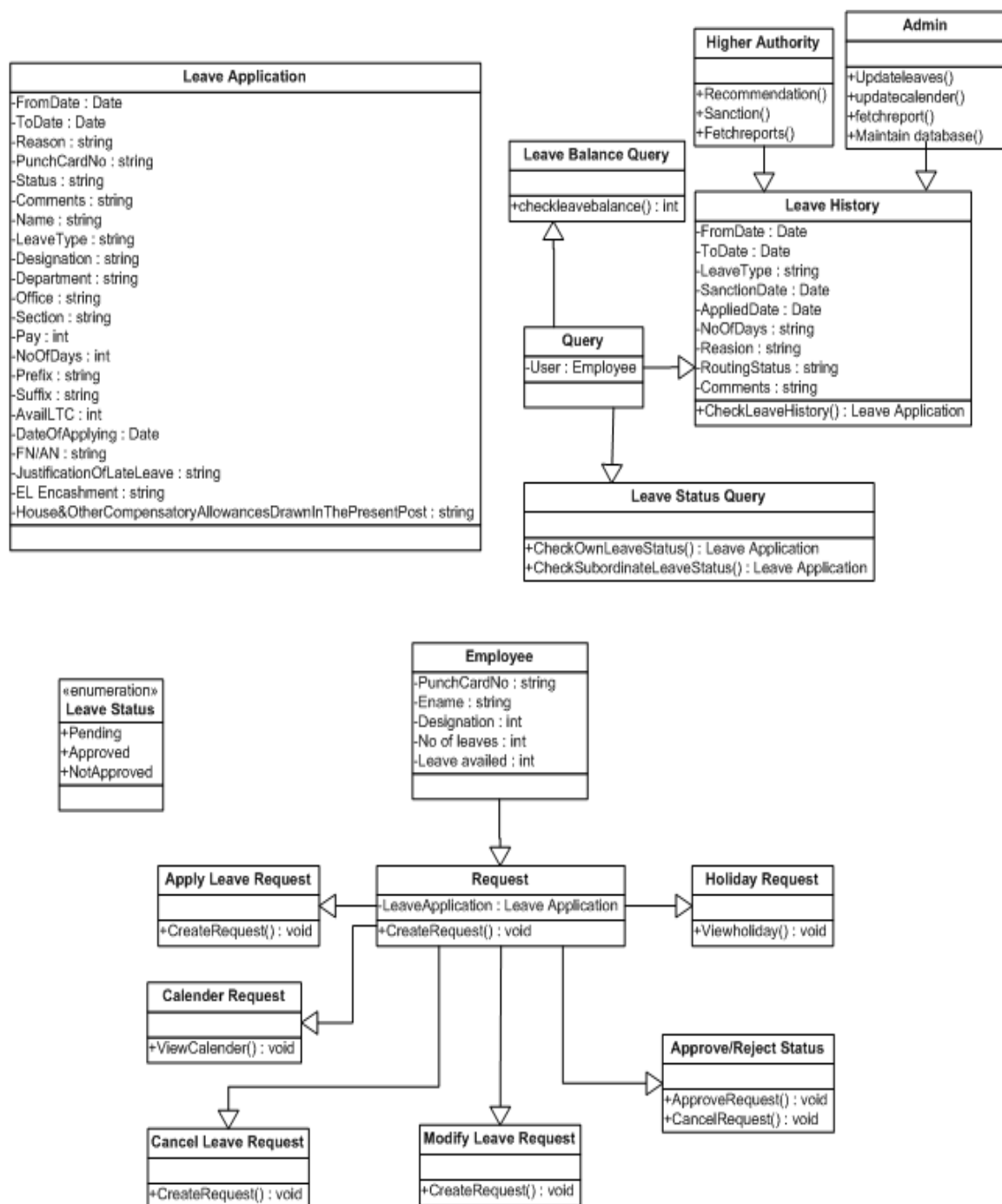


Fig.3.2 General Workflow diagram for Cancellation of Leave



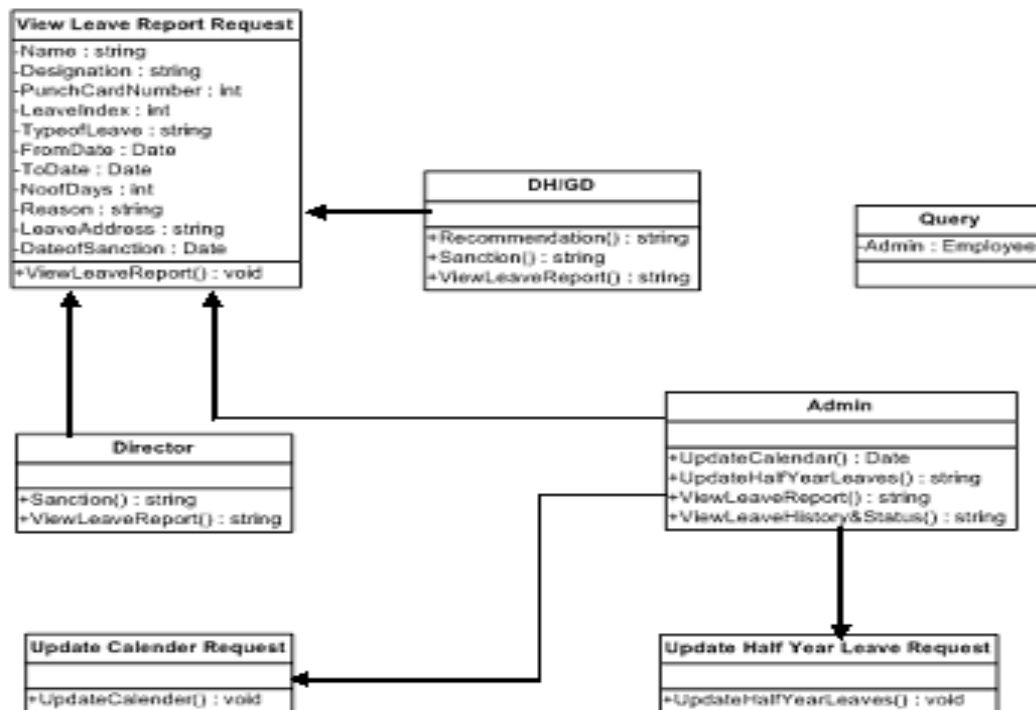


Fig.3.3 Class diagram for Leave Module

### ❖ Use Cases for Applying Leave

1. User logs in with valid credentials in the CABS portal.
2. User selects the “Leave management” option.
3. User clicks on the leave type.
  - a. Individual leave type.
  - b. Combination of leave type.
4. User selects the desired leave type combination.
5. User enters the number of days.
6. Number of days is less than or equals to leave balance.
  - a. User can apply for leave.
  - b. User can't apply for leave.

### ❖ Use Cases for Leave Cancellation

1. User logs in with valid credentials in the CABS portal.
2. User selects the “Leave management” option.
3. User clicks on the leave form that has to be canceled in the Leave history table.
4. Cancellation can be done.
  - a. Before recommendation.



- b. After recommendation.
  - c. Before sanction.
  - d. After sanction.
5. User clicks the Cancel leave button.
6. User clicks yes and attaches the required explanation form.
7. In case of cancellation, before sanction of leave, recommending authority approves cancellation.
8. In case of cancellation, after sanction and before reaching the admin officer, recommending and sanctioning authorities approve the cancellation.
9. Cancellation leave form attributes.
  - a. Yes.
  - b. No.
  - c. Attach files.

### ❖ Use Cases for Leave Modification

1. User logs in with valid credentials in the CABS portal.
2. User selects the “Leave management” option.
3. User clicks on the leave form that has to be modified in the Leave history table.
4. Modification can be done.
  - a. Before recommendation.
  - b. After recommendation.
  - c. Before sanction.
  - d. After sanction.
5. User clicks the Modify leave button.
6. The corresponding modification leave form opens.
7. User can change leave type and no of days before recommendation, after recommendation and before sanction.
8. User can change only no of days after sanction.
9. User clicks the submit button.
10. It is again routed to recommending and sanctioning authorities for approval.
11. Finally the modified leave form is recorded by the admin officer.
12. When the Recommendation authority is absent, officiating recommendation authority does the required job.

13. When the sanction authority is absent, officiating sanction authority does the required job.
14. Modification form attributes before recommendation, after recommendation and before sanction.
  - a. Leave index.
  - b. Leave type.
  - c. Applied date.
  - d. From date.
  - e. To date.
  - f. Approved date.
  - g. No of days.
  - h. Reason.
  - i. Routing status.
  - j. Comments.
15. Modification leave form attributes after sanction.
  - a. Leave index.
  - b. Applied date.
  - c. From date.
  - d. To date.
  - e. Approved date.
  - f. No of days.
  - g. Reason.
  - h. Routing status.
  - i. Comments.

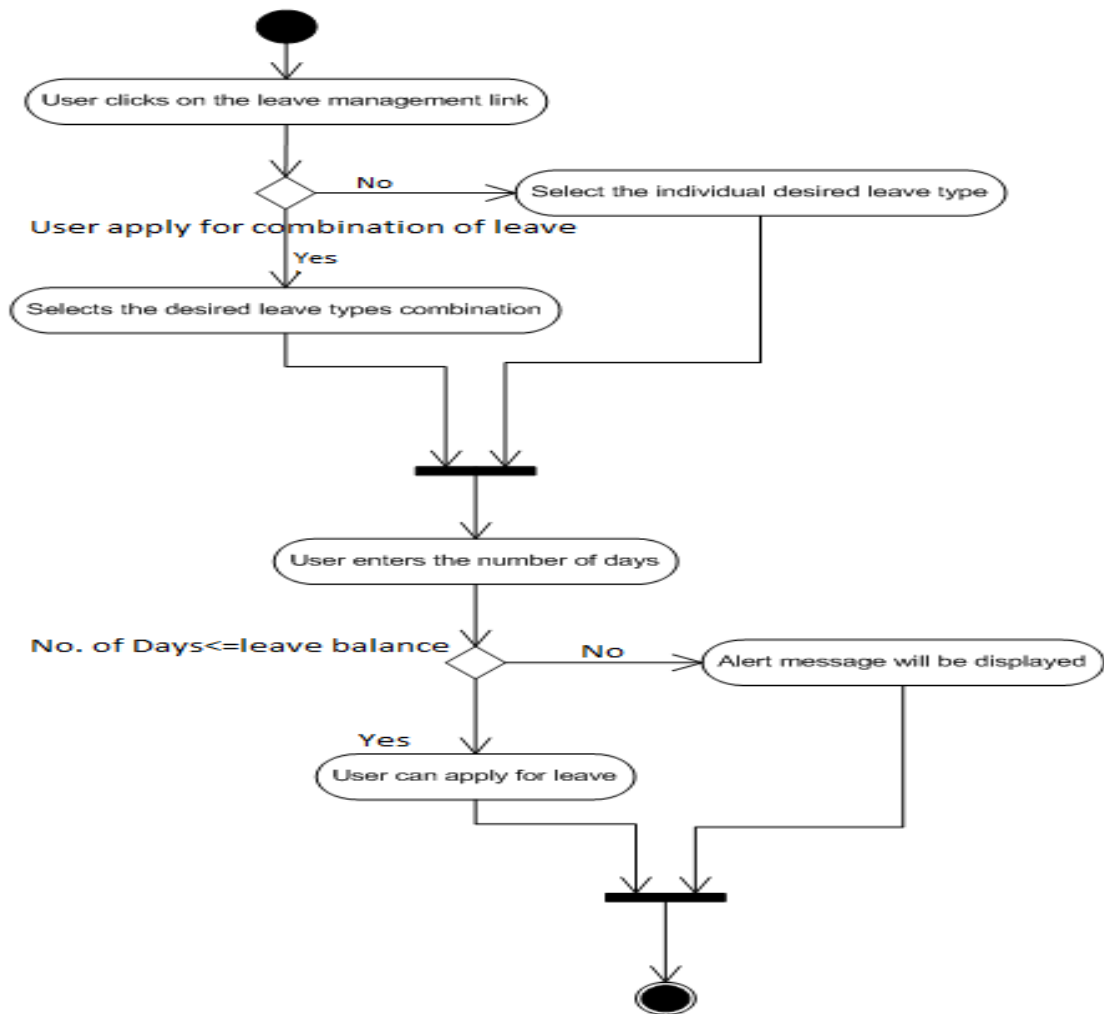


Figure 3.4 Activity diagram for Applying Leave

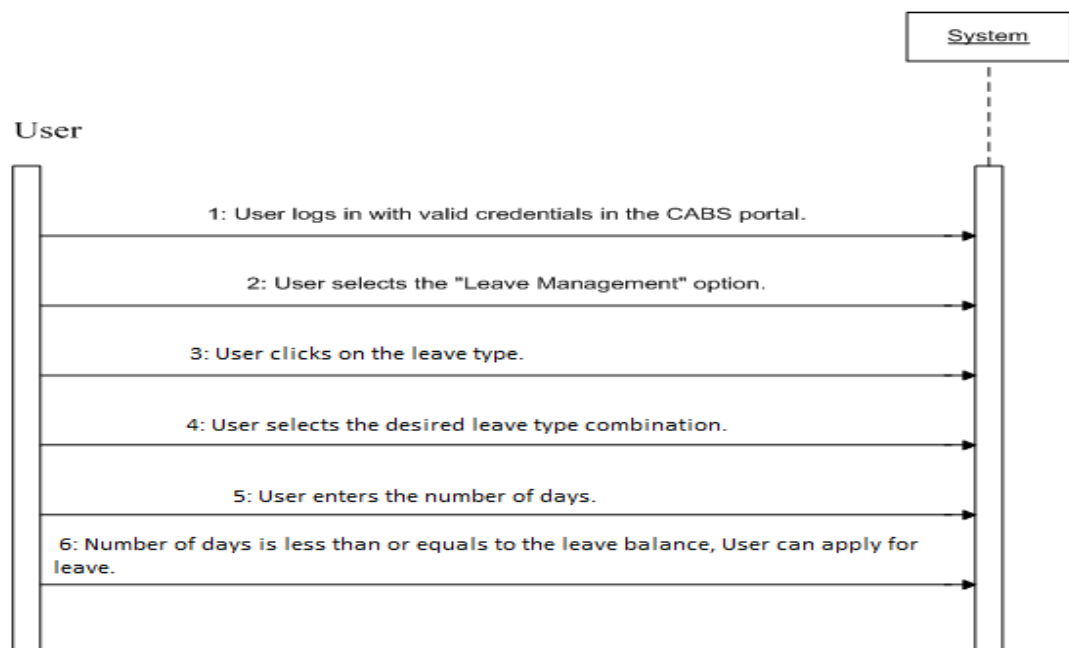


Figure 3.5 Sequence diagram for Applying Leave

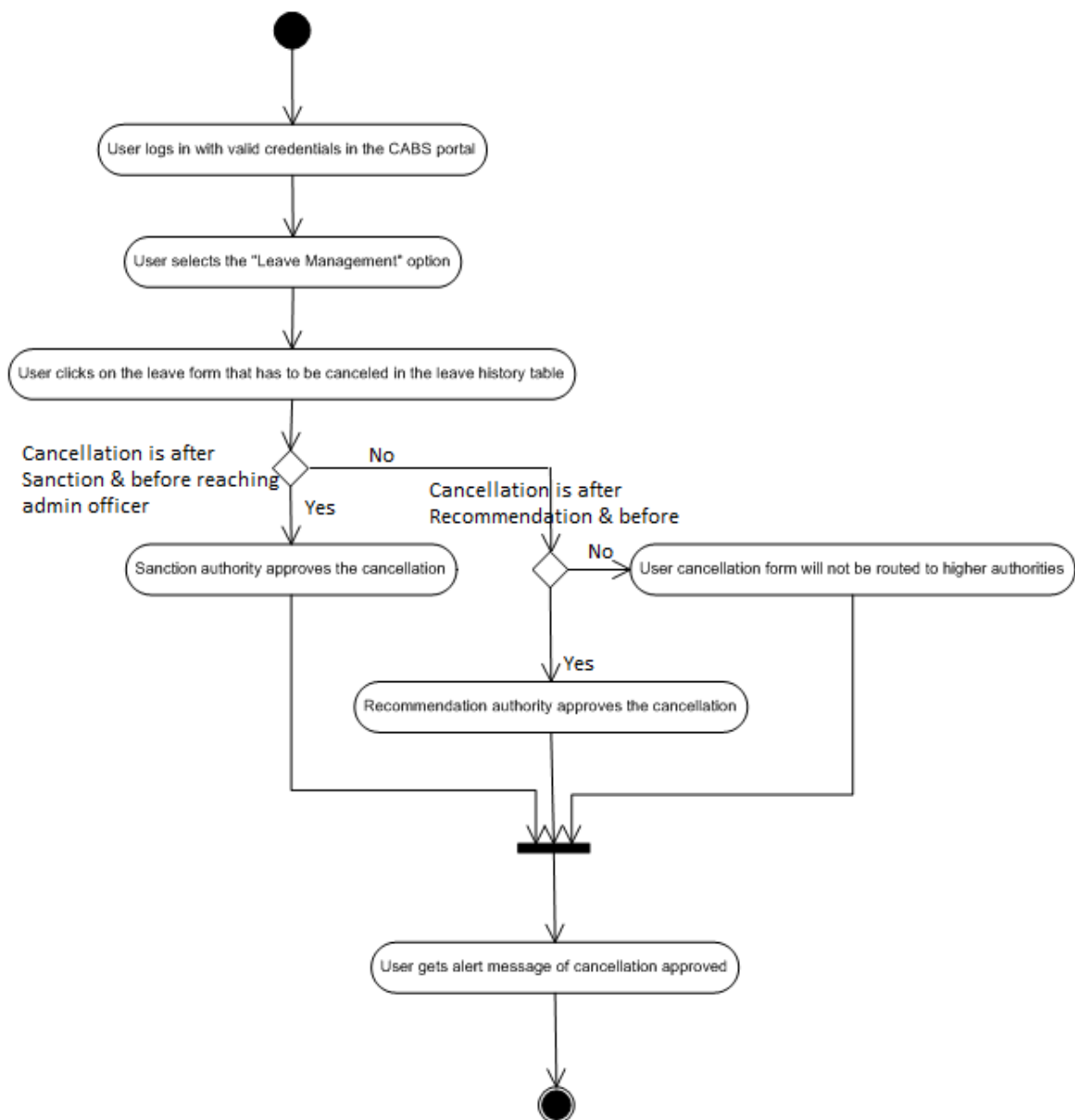


Figure 3.6 Activity diagram for Leave Cancellation

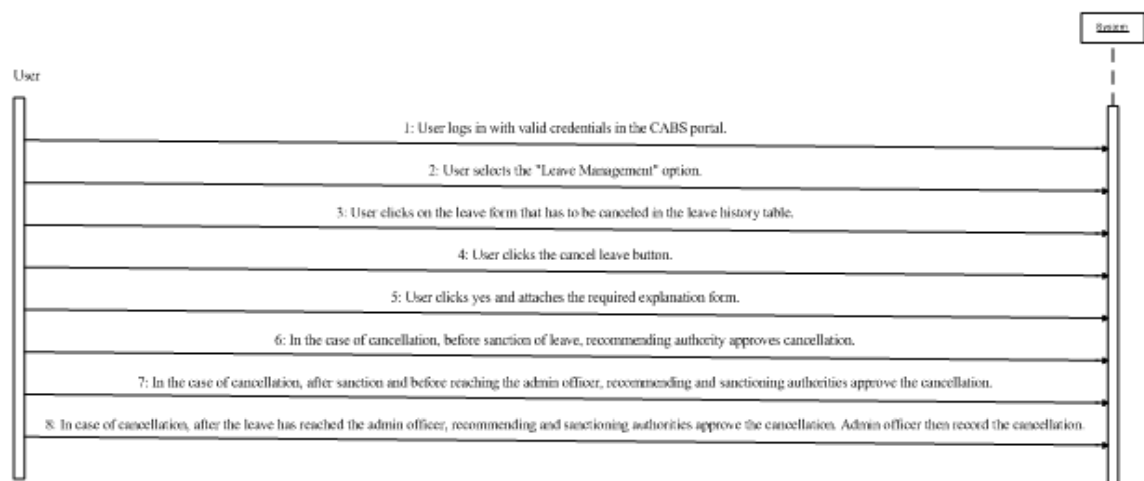


Figure 3.7 Sequence diagram for Leave Cancellation

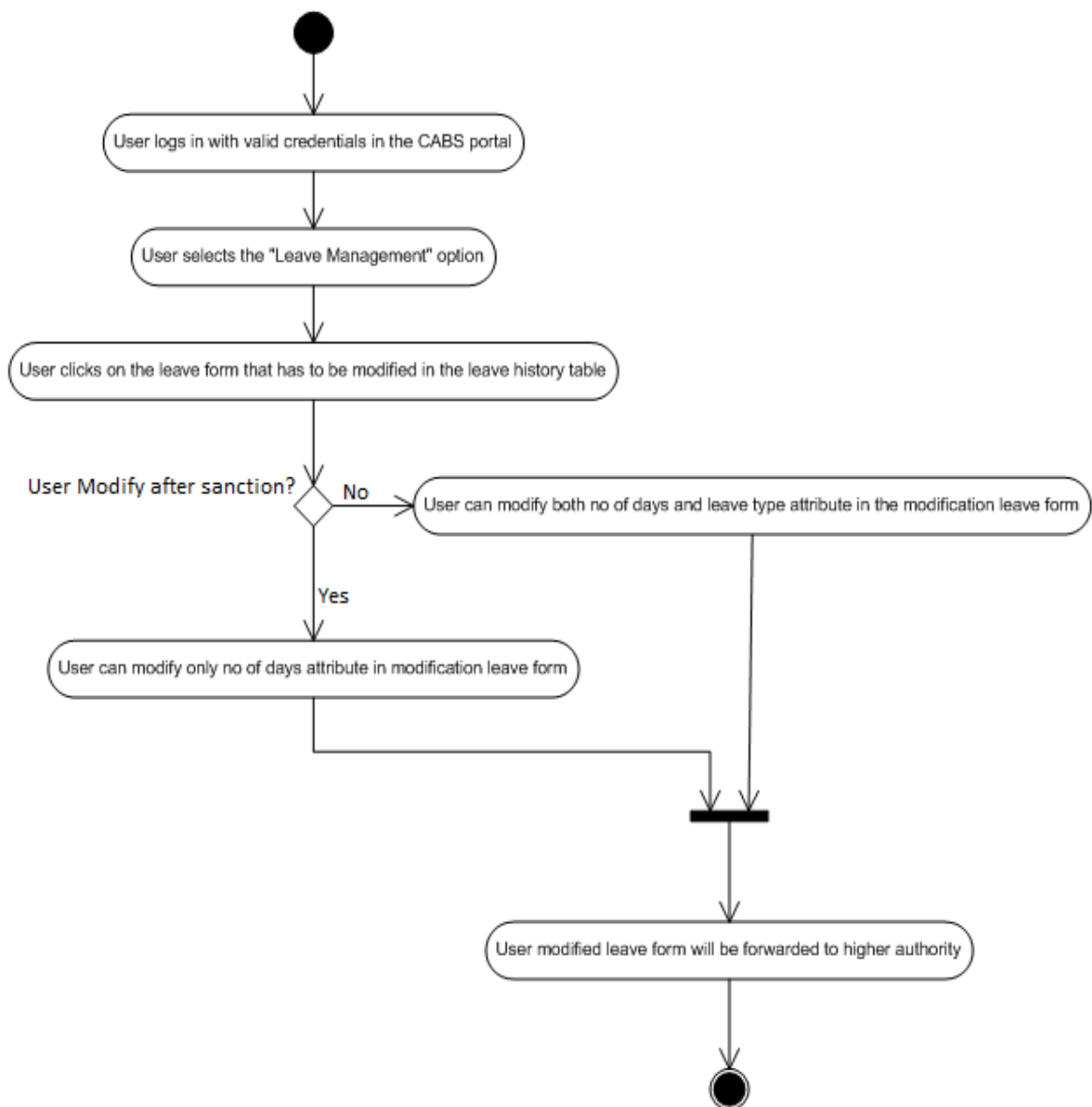


Figure 3.8 Activity diagram for Leave Modification

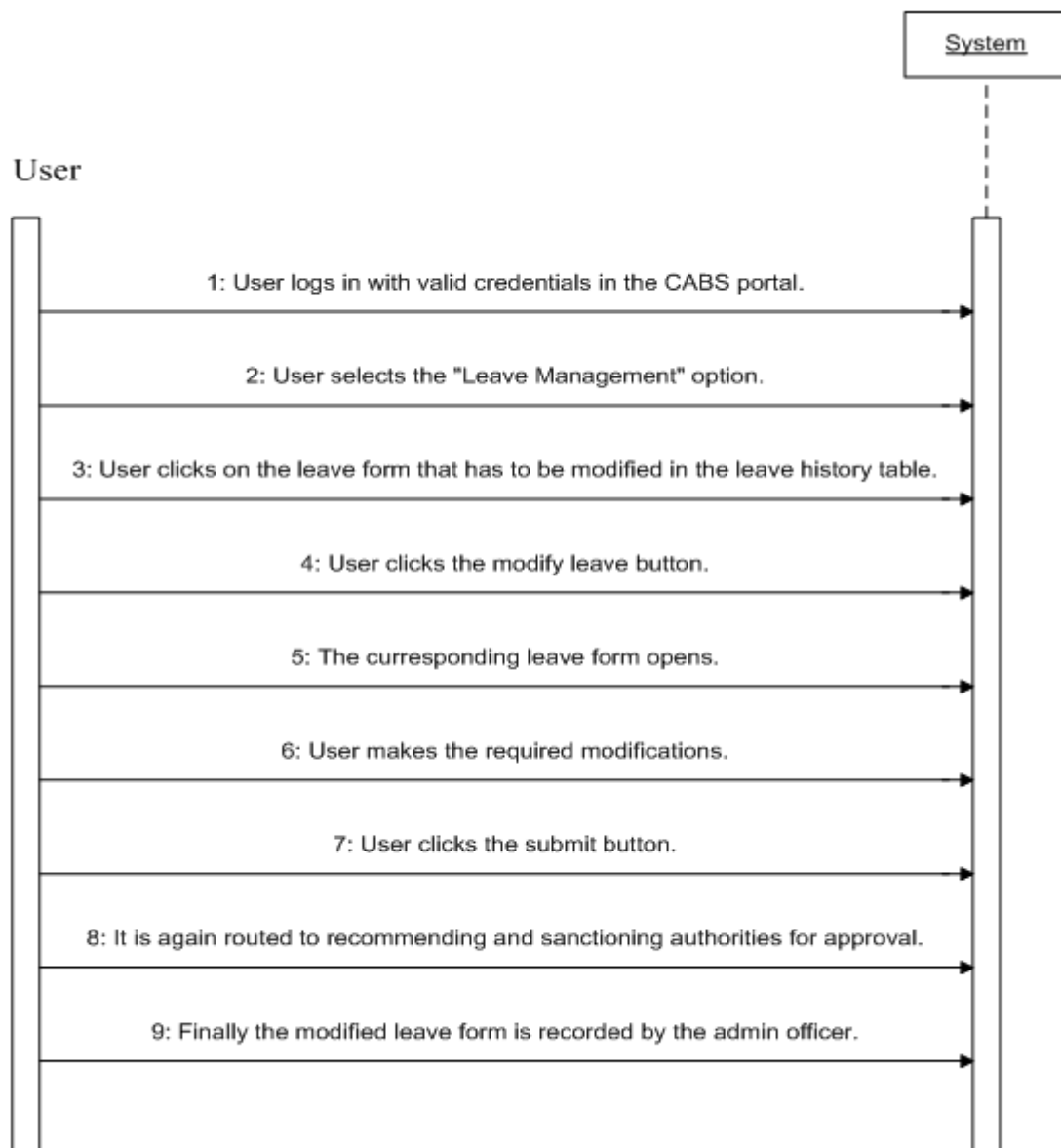


Figure 3.9 Sequence diagram for Leave Modification

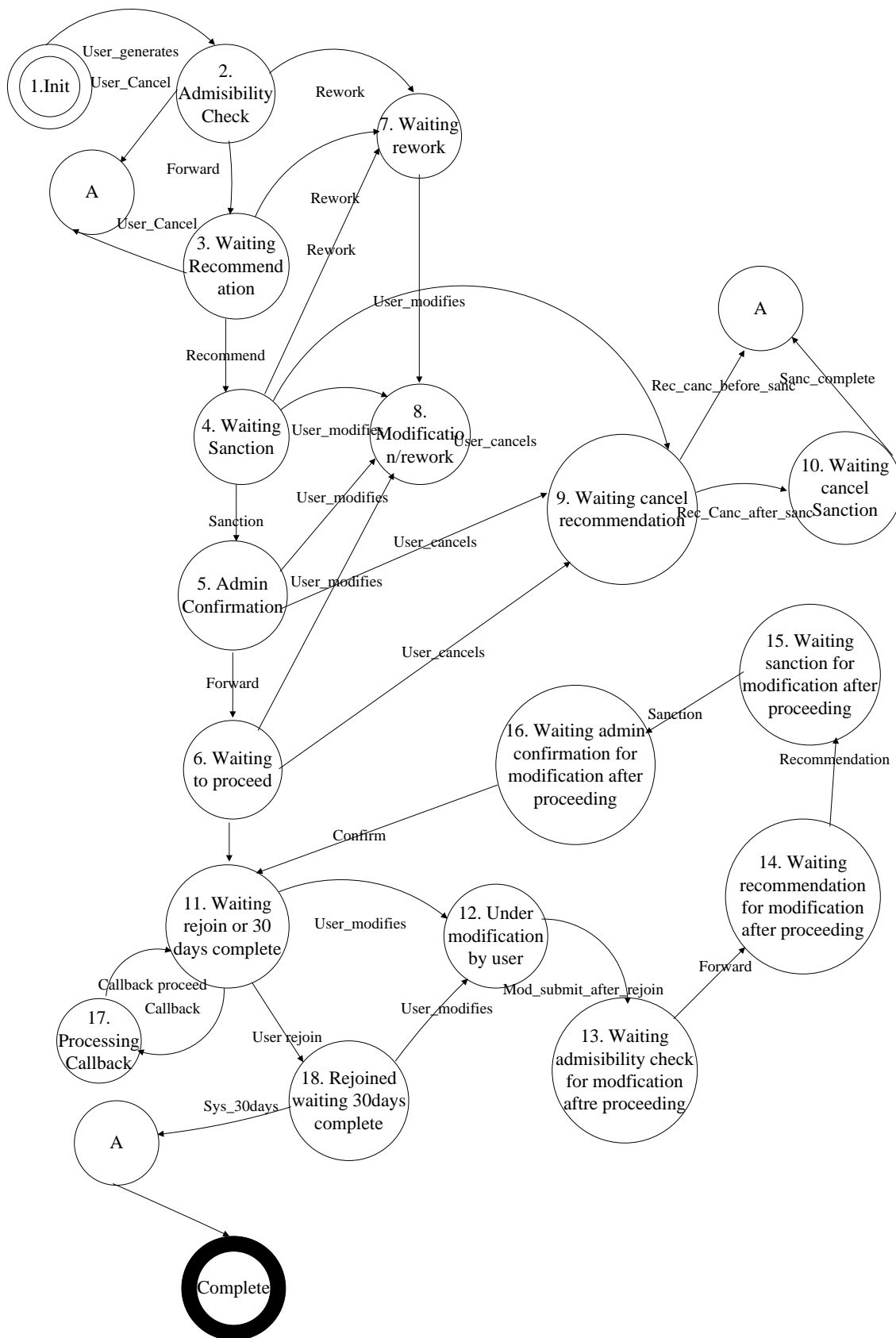


Fig.3.10 State Transition diagram for Leave Module

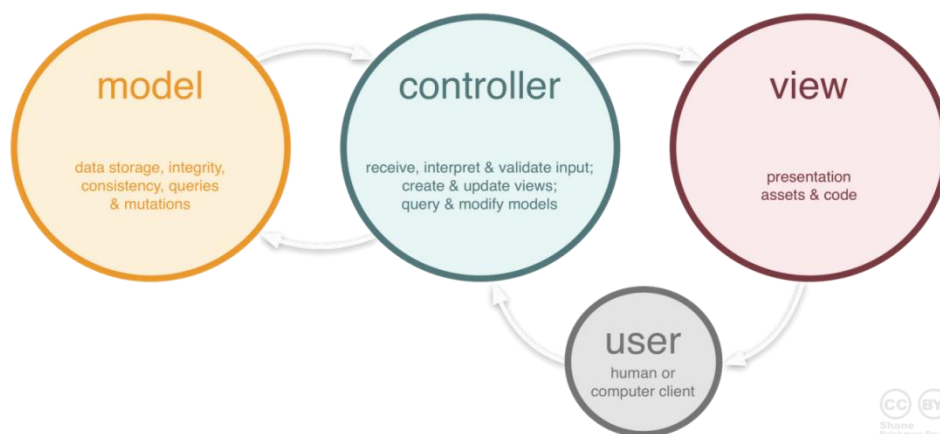
### MVC Architecture

MVC framework in Java application development, from desktop applications for basic programs to enterprise solutions written in Java. MVC framework is used to separate the data access layer, business logic code and the graphical user interface that has to be defined and designed to let the user interact with the application. This application has three parts.

**Model** - this part of the framework is to store the data of the application, such as databases, text data, files and/or other web resources.

**View** - this is the graphical user interface of the application. That would contain different buttons, text boxes and other controls to let the user interact with the application to complete his projects depending on sort of the software he is using.

**Controller** - the actual back-end code constitutes the controller of the framework. A controller controls the data coming from the users, or going to the user from a model.



Source: Google Image

Fig 3.11 Model View Controller Architecture

This sets up a condition of validation, because the stream of data (coming from or going to the user) is always validated on the controller. That is why it makes the data more consistent by removing any chance of invalid data entry or unauthorized data deletion from the application's data source.



## 3.4 Requirement Specification

### 3.4.1 HARDWARE REQUIREMENTS

Hardware	- Intel or equivalent
Speed	- 1.1 GHz
RAM	- 2GB
Hard Disk	- 500 GB or above
Key Board	- Standard Windows Keyboard
Mouse	- Two or Three Button Mouse
Monitor	- SVGA

### 3.4.2 SOFTWARE REQUIREMENTS

Operating System	: Windows Server 2003 or above
Technology	: Java and J2EE
Web Technologies	: JSP, Html, JavaScript
IDE	: Eclipse
Web Server	: Tomcat
Database	: My SQL
Java Version	: J2SDK1.7

### ❖ Software Environment

#### JAVA

Java is a general-purpose computer programming language that is concurrent, class-based, object-oriented, and specifically designed to have as few implementation dependencies as possible. It is intended to let application developers "write once, run anywhere" (WORA), meaning that compiled Java code can run on all platforms that support Java without the need for recompilation. Java applications are typically compiled to byte code that can run on any Java virtual machine (JVM) regardless of computer architecture. Java is one of the most popular programming languages in use, particularly for client-server web applications, with a reported 9 million developers.

For the user interface the tools will be HTML, CSS, and JavaScript. Apart from this for creating a web application also requires to be hosted on the server. So for the client side HTML, CSS, JavaScript will be used.

**Apache Tomcat:** - It is often referred to as Tomcat, is an open-source web server developed by the Apache Software Foundation (ASF). Tomcat implements several Java EE specifications including Java Servlet, Java Server Pages (JSP), Java EL, and Web Socket, and provides a "pure Java" HTTP web server environment for Java code to run in. Tomcat is developed and maintained by an open community of developers under the auspices of the Apache Software Foundation, released under the Apache License 2.0 license, and is open-source software. Catalina is Tomcat's Servlet container. Catalina implements Sun Microsystems' specifications for Servlet and Java Server Pages (JSP). Web Servers like Apache Tomcat support only web components while an application server supports web components as well as business components. To develop a web applications with jsp/Servlet install any web server like JRun, Tomcat etc to run your application.

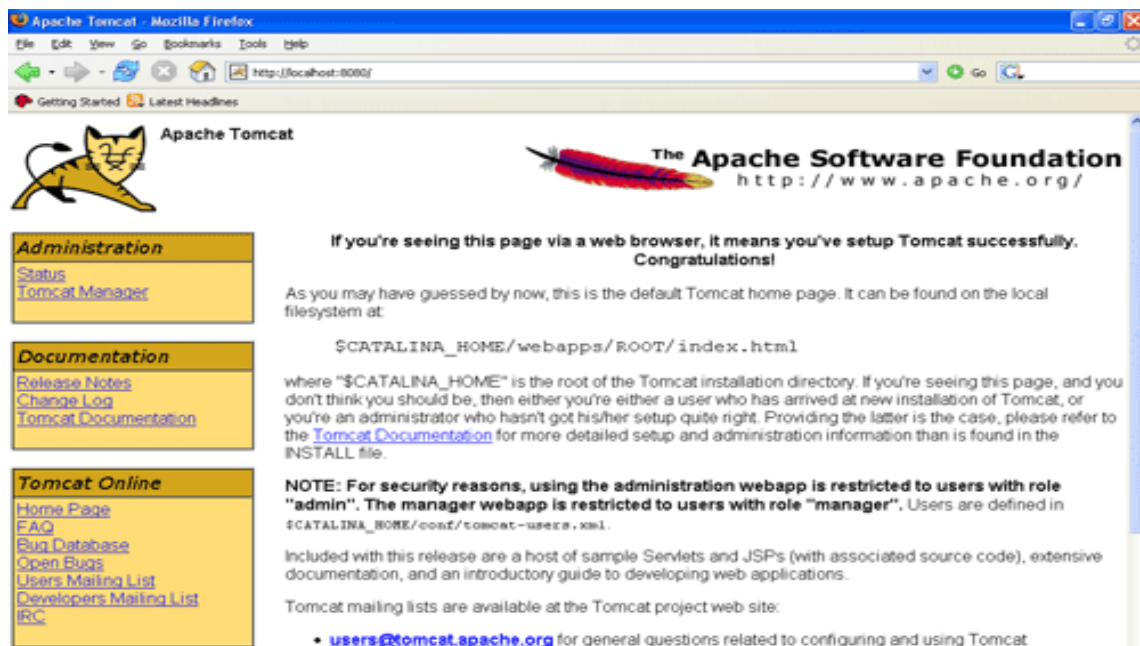


Fig3.12 Tomcat Web Server

**Eclipse IDE:** - In computer programming, Eclipse is an integrated development environment (IDE). It contains a base workspace and an extensible plug-in system for customizing the environment. Eclipse is written mostly in Java and its primary use is for developing Java applications, but it may also be used to develop applications in other programming languages through the use of plugins, including: Ada, ABAP, C, C++, COBOL, Fortran, Haskell, JavaScript, Lasso, Lua, NATURAL, Perl, PHP, Prolog, Python, R, Ruby (including Ruby on Rails framework), Scale, Clojure, Groovy, Scheme,

and Erlang. It can also be used to develop packages for the software Mathematica. Development environments include the Eclipse Java development tools (JDT) for Java and Scalar, Eclipse CDT for C/C++ and Eclipse PDT for PHP, among others. The initial codebase originated from IBM Visual Age.

The Eclipse software development kit (SDK), which includes the Java development tools, is meant for Java developers. Users can extend its abilities by installing plug-ins written for the Eclipse Platform, such as development toolkits for other programming languages, and can write and contribute their own plug-in modules. Released under the terms of the Eclipse Public License, Eclipse SDK is free and open-source software (although it is incompatible with the GNU General Public License). It was one of the first IDEs to run under GNU Class path.

**JDK:** - The Java Development Kit (JDK) is an implementation of either one of the Java SE, Java EE or Java ME platforms released by Oracle Corporation in the form of a binary product aimed at Java developers on Solaris, Linux, and Mac OS X or Windows. The JDK includes a private JVM and a few other resources to finish the development of a Java Application. Since the introduction of the Java platform, it has been by far the most widely used Software Development Kit (SDK).

**Visual Paradigm:** - Visual Paradigm for UML (VP-UML) is a UML CASE Tool supporting UML 2, SysML and Business Process Modeling Notation (BPMN) from the Object Management Group (OMG). In addition to modeling support, it provides report generation and code engineering capabilities including code generation. It can reverse engineer diagrams from code, and provide round-trip engineering for various programming languages.

### 3.5 System Testing

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub assemblies, assemblies and/or a finished product. It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an

unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

### 3.5.1 Unit Testing

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results. Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

#### a) Test strategy and approach

Field testing will be performed manually and functional tests will be written in detail.

#### b) Test objectives

- All field entries must work properly.
- Pages must be activated from the identified link.
- The entry screen, messages and responses must not be delayed.

#### c) Features to be tested

- Verify that the entries are of the correct format
- No duplicate entries should be allowed
- All links should take the user to the correct page.

### 3.5.2 Integration Testing

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically

aimed at exposing the problems that arise from the combination of components. Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects. The task of the integration test is to check that components or software applications, e.g. components in a software system or – one step up – software applications at the company level – interact without error.

- a) **Test Results:** All the test cases mentioned above passed successfully. No defects encountered.

### 3.5.3 Functional Test

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals. Functional testing is centered on the following items:

- Valid Input : identified classes of valid input must be accepted.
- Invalid Input : identified classes of invalid input must be rejected.
- Functions : identified functions must be exercised.
- Output : identified classes of application outputs must be exercised.
- Systems/Procedures : interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

### 3.5.4 System Test

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

### 3.5.5 Acceptance Testing

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.

- a) **Test Results:** All the test cases mentioned above passed successfully. No defects encountered.

### 3.6 Communications

Communication plays a very important role in the daily operation of the company. In many cases the profit and loss of the company depends heavily on the communications. They offer the opportunity to discover new technical skills, explore your career path and network with professionals. There are several ways in which the effects are brought up in a person. Following are the ways in which the communication skill becomes effective and can be improved a lot during training programs:

1. **Giving Presentation:** the presentation skills are improved by speaking in front of a group of people. The feedbacks of the people are useful and one can improve a lot by seeking guidance from the people listening to him.
2. **Technical writing:** the technical writing that involves writing about a project and description of all its related features gives knowledge about the industrial glossary. One learns about a lot of keywords and technical terms.
3. **Team meeting:** Team meeting are often hosted in the companies that gives person a lot of ideas, what other people think. It also gives information regarding what projects other people are doing in organization.
4. **Managers and Mentor Feedback:** The feedback is very important as it tells where the person really stands. It removes all the confusion about performance and some other issues.
5. **Learning and practicing:** Last but not the least the learning process is ultimately what one keeps growing in the company.

### 3.7 Project and Resource management

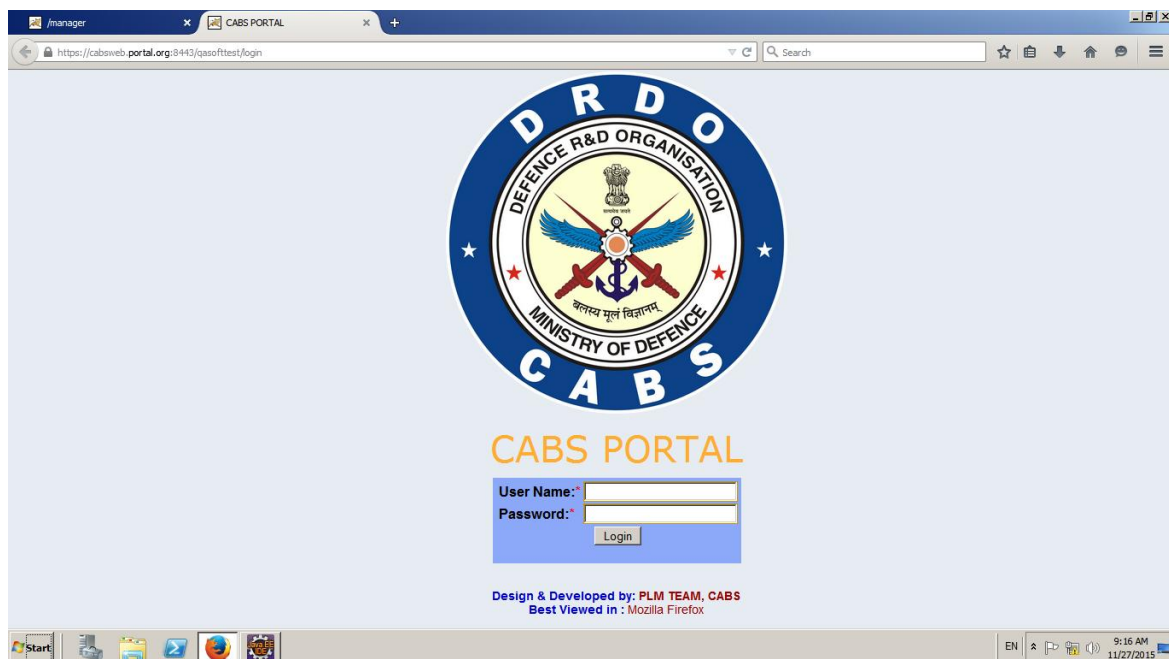
The resources of an organization consist of people, materials, equipment, knowledge and time. Organizations typically have limited resources; therefore, tradeoffs on what project resources are expended and when are made every day within organizations.

A resource allocation plan is an important tool in effective management of scarce resources.

The timing of the need of those resources can be and should be determined within the project schedules. A resource plan, which describes the type of resource needed and the timing of that need, is critical to effective resource management. As the project schedule changes, the resource plan must also be flexible enough to adjust as these changes occur. It is very important to identify the key resources in organization. The key resources are those people who have more advanced skills, knowledge or combination of skills and knowledge that makes them indispensable. To manage a project sub-dividing the project into sections for each key resource is very important. Having team leaders managing all other resources is a must for better management. Every time I learned new technologies to enhance my skills and to develop the project, I feel that working in CABS is like entering to the new world where lots of opportunities are there to learn new things.

### 3.8 Screen Shots

#### 3.8.1 Login Page

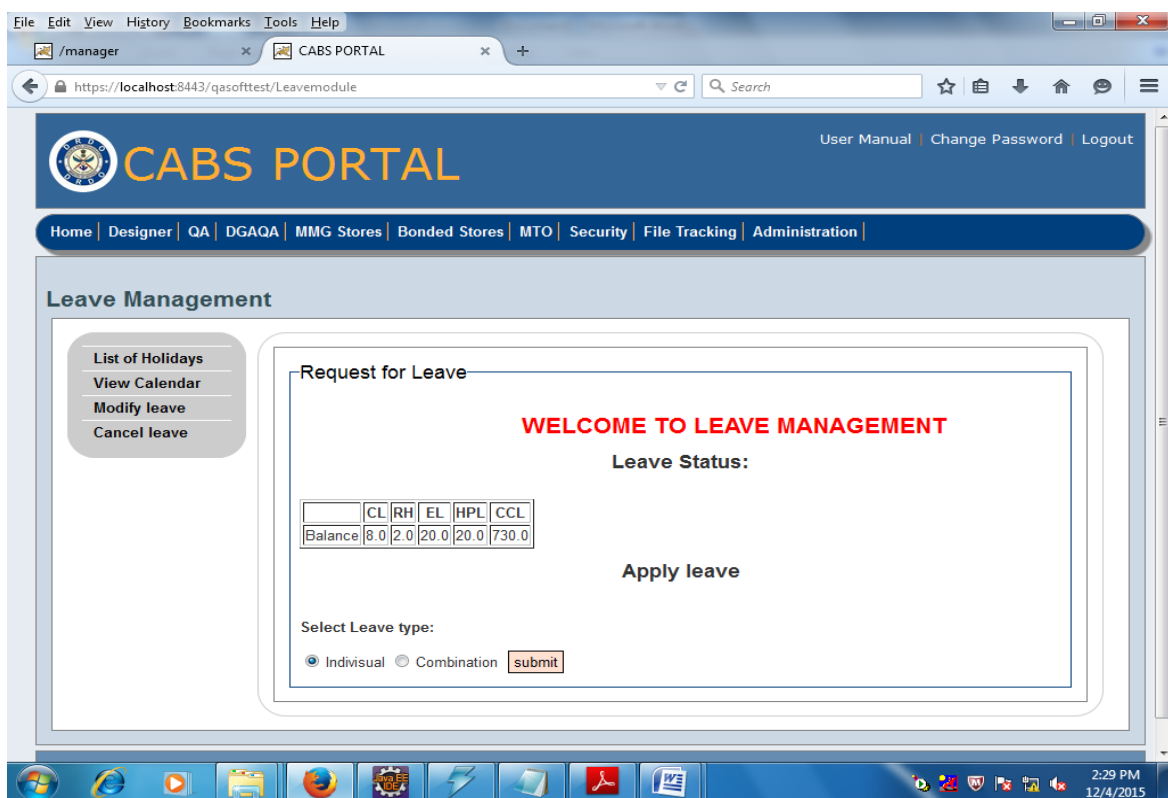




### 3.8.2 Welcome Page



### 3.8.3 Leave Request Page





## 3.8.4 Leave Type Page

The screenshot shows a web browser window with the URL <https://localhost:8443/qasofttest/individual>. The page header includes the CABS PORTAL logo and navigation links: User Manual, Change Password, and Logout. A secondary navigation bar contains links: Home, Designer, QA, DGAQA, MMG Stores, Bonded Stores, MTO, Security, File Tracking, and Administration. The main content area is titled 'Leave Management' and features a sidebar with links: Apply leave, View leave Report, View calender, Modify leave, and Cancel leave. The central form is titled 'Request for Leave' and contains a 'Leave type' dropdown menu with the text 'select type'. The footer of the page states '© Copyright 2015 Centre for Airborne Systems'.

## 3.8.5 Leave Form

The screenshot shows a web browser window with the URL <https://localhost:8443/qasofttest/CCLform>. The page header and navigation bars are identical to the previous screenshot. The main content area is titled 'Leave Management' and features the same sidebar. The central form is titled 'CCL form' and contains the following fields and options:

- Name:
- Punch card no.:
- Designation:  Office:
- Section:
- Name of the child for whom CCL is being applied for:
- Date of birth of child:
- Is child physically disable: ☒ Yes ☐ No
- If yes, Attach file:
- Date on which child attains 18 years of age:
- Date on which child attains 22 years of age:
- Is the child amongst the two:

The footer of the page shows the system time as 3:00 PM on 10/1/2015.

## 3.8.6 View Leave Status page

The screenshot displays the 'View Leave Status' page within the CABS PORTAL. The page is accessed via a web browser at the URL <https://localhost:8443/qasofttest/viewstatus1>. The portal's header includes the CABS PORTAL logo and navigation links such as 'User Manual', 'Change Password', and 'Logout'. A secondary navigation bar lists various modules: 'Home', 'Designer', 'QA', 'DGAQA', 'MMG Stores', 'Bonded Stores', 'MTO', 'Security', 'File Tracking', and 'Administration'. The main content area is titled 'Leave Management' and features a sidebar with options: 'List of Holidays', 'View Calendar', 'Modify leave', and 'Cancel leave'. The central section, 'My leave Requests', allows users to select a date (04/12/2015) and submit a request. It also includes a search bar and a table of leave requests. The table has columns for 'Leaveindex', 'Requested by', 'Leavetype', 'No of days', 'State', and 'Action'. A single entry is displayed for 'LEAVE/2015/000040' requested by 'AJAY RAJPOOT' with a leave type of 'cl' and 1.0 days. The state is 'Modification forwarded to admin check', and the action buttons are 'Cancel' and 'Modify'. The page footer indicates 'Showing 1 to 1 of 1 entries' and includes 'Previous' and 'Next' navigation links. The bottom of the screenshot shows a Windows taskbar with the date 12/4/2015 and time 2:28 PM.

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## **CHAPTER 4**

### **REFLECTION NOTES**

The opportunities provided by CABS DRDO does not only improve job skills and help along career track and research skill, but is also enjoyable and engaging. The internship extends education with hands-on projects. There is a real-world experience, learning about industry and a glimpse of what a career is like at CABS DRDO. The purpose of an internship is to provide a meaningful learning experience for the student. It is possible that the work done during an internship may still be minimal, but it should be meaningful in helping the student understand the job, profession, or field. An internship provides the opportunity to gain hands on work experience that you just can't get in the classroom. The organization is willing to train interns and give them the experience they would need to get a job. It's a chance to prove the worth of qualifications and to show that one can perform in the role been given. Internships also give the opportunity to gain some self-confidence. Figure out what our strengths are and really shine. It is also a good time to identify our weaknesses so they too can become stronger. College is an amazing place to learn self-reliance and independence. An internship is a great place to use those qualities.

#### **4.1 Internship experience in CABS DRDO**

My internship at Experience has taught me more than I could have imagined. As the Intern, I feel my duties were diverse, and ever-changing. Sometimes it's tough to recall everything I have taken in over the past months, but I feel that these are some of the most beneficial lessons I have learned.

Coming into this position, I felt that I had no idea where my career was going and I lacked confidence about what I could do and what I am really good at. My internship has definitely given me a better understanding of my skill set and where my career may take me, but most importantly, I've come to learn that I am not alone. This job has taught me that almost everybody is in my same position. Very few college students know what they want to do, and it is something that is simply not worth worrying about. Thanks to my I know that if I continue to work hard things will fall into place.

I have always enjoyed writing, and always felt that I was pretty good at it. Yet, what this position taught me is that I really didn't have sufficient writing skills I thought I had. Writing takes practice and I simply was not practicing enough. Writing for the web and writing your average research paper could not be more different. I had to learn to adapt a new tone with my writing, something that took a little getting used to. This position kept me writing something new every day, and I can say that my writing has improved drastically.

I was a person who was not a very technically sound when I came to CABS DRDO. For writing even a small snippet of code was not an easy thing for me. And in case I get stuck at some point I always need the help of other people around to solve the problem, But after coming in the organization. I gained a lot of knowledge not only about programming but also learnt how to solve a problem by my own. Now I am good in few programming languages. Apart from this I am aware of many new tools and technologies that are prevalent in the organization.

This being my first position in an office atmosphere, I didn't know exactly what to expect. The environment here at Experience is quite relaxed, yet it taught me how to behave in the workplace. Simply working in the office and getting used to everything here has definitely prepared me for whatever my next position may be. Just observing the everyday events has taught me more about teamwork, and how people can come together to get things done. Although sometimes I have to remind myself to use my inside voice, I feel I've adapted to the office life relatively well.

Like I said, this internship has improved my skills a ton, both off paper and on paper. I realized it all of this time, but this position served not only as a positive learning experience, but a resume builder as well. I came into this with a resume that was basically naked, now I am leaving and I have lots of updating to do. My resume doesn't need a makeover, it needs to be restarted from scratch, and that's a good thing! I underestimated how much work I did that actually translates to my resume.

## **4.2 Assessment in internship**

Internships are integral parts of many professional degree programs. Potentially, they make significant contributions to an educational experience. “Well-organized and carefully supervised programs enhance the student’s ability to integrate academic knowledge with practical application, improve job/career opportunities after graduation, create relevance for past and future classroom learning, develop work place social and human relations skills, and provide the opportunity for students to apply communication and problem-solving skills.

Students also send regular emails to their on-campus internship supervisors. At the conclusion of the internship, they prepare a paper that includes an overview of the accounting field, an overview of the company where the internship was completed, a reaction to the internship, and an evaluation of it based on its relationship to previously completed coursework. This paper is accompanied by an oral presentation. All these materials are assessed by the on-campus internship supervisor. A student’s performance during the internship is evaluated by the on-site supervisor as well.

Employers and Students benefit from internships in different ways. For employers who are looking for the cream of the crop among college-educated, entry-level employees, an internship program is the best way for them to build a pipeline of talented, young professionals. The market for the best and brightest students is the most competitive I've ever seen. Interns are valuable assets for employers for several reasons.

In addition to being a pipeline for hiring, interns fill positions and assist employers with innovative ideas and technology. Internships open all sorts of doors for students. Students gain an insider's view to a possible career path and networking opportunities. Above all, internships could lead to a full-time position for that company.

### 4.3 Technical Outcomes

- a) To perform to the best of my abilities those tasks assigned by my mentor.
- b) To perform to the best of my abilities those tasks related to the established outcomes of the internship experience.
- c) To Develop and Design a module by using Standard Benchmarking Tool.
- d) To follow rules, regulations and normal work requirements of the cooperator and organization.
- e) To abide by a professional code of conduct and ethics.
- f) To complete all assignments and forms associated with the internship credit in a timely manner.
- g) Bridge the gap between theoretical study and the professional world.
- h) Find out exactly what engineers do in order to decide if they want to spend their lives as engineers.
- i) Close dialogue and cooperation with a company.
- j) Become professionals who can take their learning in the classroom and adapt it to the workplace.
- k) Get a head start on classroom learning by working with engineering principles on the job.
- l) Opportunities to test theoretical knowledge in real life situations.
- m) Knowledge of business life specifically regarding work methods and processes.
- n) An option to put education into perspective according to the job market.
- o) Relevant experience added to our CV.

Every time I learned new technologies to enhance my skills and to develop the project, I feel that working in CABS is like entering to the new world where lots of opportunities are there to learn new things.

The hands-on knowledge which I have learned from CABS DRDO is:-

- a) JAVA
- b) Java Server Page (JSP)
- c) MySql
- d) Java Servlet
- e) J2EE
- f) HTML

### **4.3.1 Non-Technical Outcomes**

- Adaptability- Quickly adjusts to workplace changes and new challenges.
- Cross-cultural Interpersonal Abilities- Connecting with people outside native culture.
- Communication skills- Expressing precisely and clearly.
- Multicultural awareness- Understanding and respecting varied world views.
- Problem-solving- Finding creative solutions to problems.
- Teamwork- The ability to work well with others and gain consensus.
- Talk to people outside our department.

## **4.4 Contribution to the organization**

Every intern has some expectation from the organization where he wants to learn as many things as possible. Because the period of internship is a very golden period where one can learn a lot. In job also people learn but that time one is expected to learn about a specific field, whereas during internship one can explore a lot of other things as well. During the first year of his career one learns a lot.

While learning he may also experience a lot of problems. He learns from those problems and these experiences pay a lot to the person later in his life. Growth of every organization depends on the dedication, hard work, creativity and ability of each and every employee.

## **4.5 Communication skills**

Communicational skills are a fundamental part of a gainful working environment, permitting representatives to cooperate durably and professionally. Little entrepreneurs can do well to contract representatives with strong relational abilities, and there are additionally approaches to enhance correspondences aptitudes in the working environment to support worker efficiency.

Enhancing worker relational abilities through preparing activities and conduct demonstrating can give your organization a focused edge.

Communication plays a very important role in the daily operation of the company. In many cases the profit and loss of the company depends heavily on the communications. They offer the opportunity to discover new technical skills, explore your career path and network with professionals.

The following things one experience during the internship which also aid in bringing the effectiveness in communication. There are several ways in which the effect is brought up in a person.

Following are the ways in which the communication skill becomes effective and can be improved a lot during training programs:

- a) **Giving Presentation:** the presentation skills are improved by speaking in front of a group of people. The feedback of the people is useful and one can improve a lot by seeking guidance from the people listening to him. Apart from feedback he learns to deliver right kind of material to right audience. He learns to speak what is relevant to the topic and also his convincing skills enhances when he clarifies the doubts of the audience.
- b) **Technical writing:** The technical writing that involves writing about a project and description of all its related features gives knowledge about the industrial glossary. One learns about a lot of keywords and technical terms. The email writing skills are developed side by side when they have to convey the project details to superiors. Engineers often find it difficult to communicate their technical knowledge to audiences that have less technical backgrounds. For example, engineers must write reports and convey the essential technical details for managers—often a tough challenge because many managers don't understand the technology.



- c) **Team meeting:** Team meeting are often hosted in the companies that gives person a lot of ideas, what other people think. It also gives information regarding what projects other people are doing in organization.
- d) **Managers and Mentor Feedback:** The feedback is very important as it tells where the person really stands. It removes all the confusion about performance and some other issues.
- e) **Learning and practicing:** Last but not the least the learning process is ultimately what one keeps growing in the company.

### 4.6 Personality development

Personality development is a very broad term. It includes a lot of aspects related to human personality and to develop ones personality is very important in today's world to survive. A pleasing personality is not only required to please someone but also to make place in the society. For different people personality has one or other meaning. But a few things are very common and these things we also learn during internship. Following are a few things that we learn:

- a) **Become confident**

Being confident about who you are and what you are doing is the most important tip for personality development. Never doubt your capabilities and if there is something you need to work upon then put in all the effort so you can come over your fears and gain confidence.

- b) **Check attire**

One's attire has an important role to play while making a desirable impression. And not just that, but it also gives yourself a confidence boost knowing that you look good and are dressed appropriately.

**c) Work on Body Language**

Everything including the way you walk, sit, talk or eat leaves an impact over the people around you and having a correct body language can do wonders for your personality.

**d) Good listening skills**

Being a good listener may not seem like but it is an important step towards achieving a more likable personality. When somebody talks to you, listen with interest and give them all the attention and importance. Maintain a direct eye contact.

**e) Read more often and develop new interests**

A man of very few interests has very little to talk about. But if you are well informed about things and cultivate a number of interests, more people tend to like you. You can strike up interesting conversations instead of appearing to be dull and monotonous.

**f) To have an opinion**

Having an opinion and being able to confidently put it forward doesn't just help making your conversations interesting but it also makes you look more influential and well informed around other people. Never shy away from projecting your opinions even if they happen to conflict with those of other people.

**g) Positivity in outlook**

Thoughts and actions both need to be positive in order to have an attractive personality. The way we think has a lot of effect on the way how we act. And if one prospers positive thoughts inside his mind then that also gives him a confidence boost and enhances their personality.

## 4.7 Time management skills

Internship also teaches how to manage time. Since time management is a hard to learn art one should attend some classes for this also. There is a famous saying that time and tide waits for none. So time management skills need to be developing and schedule should be followed seriously. Following way on can learn the time management skills:

- a) Carrying a schedule and record all thoughts, conversations and activities for a week. This helps to understand how much can get done during the course of a day and where precious moments are going.
- b) Any activity or conversation that's important to success should have a time assigned to it. To-do lists get longer and longer to the point where they're unworkable.
- c) Scheduled time for interruptions should be there. Plan time to be pulled away from what we are doing. Take, for instance, the concept of having "office hours." Isn't "office hours" another way of saying "planned interruptions."
- d) Taking the first 30 minutes of every day to plan your day. Don't start your day until you complete your time plan. The most important time of your day is the time we schedule to schedule time.
- e) Taking five minutes before every call and task to decide what result you want to attain. This will help you know what success looks like before you start. And it will also slow time down.

## 4.8 Resource utilization

The purpose of resource utilization is to bring together people, processes and tools to accomplish a common objective. One of the most important elements of resource utilization is managing the resources that actually do the work. In practice, however, many focus on measuring resources rather than acting as a force multiplier that understands and motivates their team.

Following are the ways to manage and utilize the resources effectively in a team:

- a) Soft skills like communication, leadership and emotional intelligence are necessary to effectively communicate with team members in order to inspire and motivate.
- b) Maintaining a centralized schedule of your resources to accurately determine workloads and identify possible conflicts.
- c) Building a strategy to address possible resource shortages in projects by defining accurate work efforts for the tasks at hand.
- d) Incorporate capacity tracking reports into your strategy that will provide additional visibility into departmental and staffing statuses to work on projects.
- e) Prioritizing resources and categorize them in different buckets to efficiently get the most out of your team.
- f) Include contingency plans in your resource management strategy that allows for a 'Plan B' when unexpected changes occur.

## **ANNEXURE**

AEW&CS	-	Airborne Early Warning & Control System
CABS	-	Centre for Airborne Systems
CAL	-	Child Adoption Leave
CL	-	Casual Leave
CCL	-	Child Care Leave
CML	-	Commuted Leave
DG	-	Directors General
DH	-	Division Head
EL	-	Earned Leave
EOL	-	Extra Ordinary Leave
GD	-	Group Director
GNU	-	General Public License
HPL	-	Half Pay Leave
IDE	-	Integrated Development Environment
JDK	-	Java Development Kit
JDT	-	Java Development Tool
JSP	-	Java Server Page
JVM	-	Java Virtual Machine
LND	-	Leave Not due
LPR	-	Leave Preparatory to Retirement
LTC	-	Leave Travel Concession
ML	-	Maternity Leave
PL	-	Paternity Leave
RH	-	Restricted Holiday
SCL	-	Special Casual Leave
SDK	-	Software Development Kit
SDL	-	Special disability Leave
STA	-	Senior Technical Assistant

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