

**Development of a Student Database Management System for polytechnic sector**

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**ABSTRACT:-** *Today, more than at any previous time, the success of an organization depends on its ability to acquire accurate and timely data about its operations, to manage this data effectively, and to use it to analyse and guide its activities. The current scenario in the board is that it is registering about 10000 students at Polytechnic level per year and hence the work load is a very huge. Also because the number of students enrolled in board has increased manifold just in last couple of years only, all the processes in the board are manual with very little intervention of IT and thus the work becomes much more tedious and tough and is prone to errors . This paradox drives the need for increasingly powerful and flexible data management systems. To get the most out of their large and complex datasets, users must have tools that simplify the tasks of managing the data and extracting useful information in a timely fashion. Otherwise, data can become a liability, with the cost of acquiring it and managing it far exceeding the value that is derived from it.*

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**Keywords:** *The Jammu and Kashmir State Board of Technical Education (JKSBOTE); Data base; student; database-management system (DBMS)*

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**INTRODUCTION**

A database-management system (DBMS) is a collection of interrelated data and a set of programs to access those data. The database contains information relevant to an enterprise. The primary goal of a DBMS is to provide a way to store and retrieve database information that is both convenient and efficient. By data, we mean known facts that can be recorded and that have implicit meaning. A datum – a unit of data – is a symbol or a set of symbols which is used to represent something. This relationship between symbols and what they represent is the essence of what we mean by information. Hence, information is interpreted data – data supplied with semantics. Knowledge refers to the practical use of information. While information can be transported, stored or shared without many difficulties the same cannot be said about knowledge. Knowledge necessarily involves a personal experience. Database systems are designed to manage large bodies of information. Management of data involves both defining structures for storage of information and providing mechanisms for the manipulation of information. In addition, the database system must ensure the safety of the information stored, despite system crashes or attempts at unauthorized access. If data are to be shared among several users, the system must avoid possible anomalous results. Because information is so important in most organizations, computer scientists have developed a large body of concepts and techniques for managing data.

**Advantages of DBMS**

**Data independence:** Application programs should be as independent as possible from details of data representation and storage. The DBMS can provide an abstract view of the data to insulate application code from such details.

**Efficient data access:** A DBMS utilizes a variety of sophisticated techniques to store and retrieve data efficiently. This feature is especially important if the data is stored on external storage devices.

**Data integrity and security:** If data is always accessed through the DBMS, the DBMS can enforce integrity constraints on the data. Also, the DBMS can enforce *access controls* that govern what data is visible to different classes of users.

**Data administration:** When several users share the data, centralizing the administration of data can offer significant improvements. Experienced professionals, who understand the nature of the data being managed, and how different groups of users use it, can be responsible for organizing the data representation to minimize redundancy and fine-tuning the storage of the data to make retrieval efficient.

**Concurrent access and crash recovery:** A DBMS schedules concurrent accesses to the data in such a manner that users can think of the data as being accessed by only one user at a time. Further, the DBMS protects users from the effects of system failures.

**Reduced application development time:** Clearly, the DBMS supports many important functions that are common to many applications accessing data stored in the DBMS. This, in conjunction with the high-level interface to the data, facilitates quick development of applications. Such applications are also likely to be more robust than applications developed from scratch because many important tasks are handled by the DBMS instead of being implemented by the application. In most situations calling for large-scale data management DBMSs have become an indispensable tool.

## DATA MODEL

Underlying the structure of a database is the data model: a collection of conceptual tools for describing data, data relationships, data semantics, and consistency constraints.

To illustrate the concept of a data model, we outline two data models in this section: the entity-relationship model and the relational model. Both provide a way to describe the design of a database at the logical level.

**The Entity-Relationship Model:** The entity-relationship (E-R) data model is based on a perception of a real world that consists of a collection of basic objects, called entities, and of relationships among these objects. An entity is a “thing” or “object” in the real world that is distinguishable from other objects. For example, each person is an entity, and bank accounts can be considered as entities. Entities are described in a database by a set of attributes. A relationship is an association among several entities. The set of all entities of the same type and the set of all relationships of the same type are termed an entity set and relationship set, respectively. The overall logical structure (schema) of a database can be expressed graphically by an E-R diagram.

**Relational Model:** The relational model uses a collection of tables to represent both data and the relationships among those data. Each table has multiple columns, and each column has a unique name. The data is arranged in a relation which is visually represented in a two dimensional table. The data is inserted into the table in the form of tuples (which are nothing but rows). A tuple is formed by one or more than one attributes, which are used as basic building blocks in the formation of various expressions that are used to derive meaningful information. There can be any number of tuples in the table, but all the tuple contain fixed and same attributes with varying values. The relational model is implemented in database where a relation is represented by a table, a tuple is represented by a row, an attribute is represented by a column of the table, attribute name is the name of the column, and attribute value contains the value for column in the row. Constraints are applied to the table and form the logical schema. In order to facilitate the selection of a particular row/tuple from the table, the attributes i.e. column names are used, and to expedite the selection of the rows some fields are defined uniquely to use them as indexes, this helps in searching the required data as fast as possible. All the relational algebra operations, such as Select, Intersection, Product, Union, Difference, Project, Join, Division, Merge etc. can also be performed on the Relational Database Model. Operations on the Relational Database Model are facilitated with the help of different conditional expressions, various key attributes, pre-defined constraints etc.

## DESIGN AND DEVELOPMENT OF INTERFACE

The various entities present in the database are

1. **STUDENT:** It captures the entire information about the student. The various attributes of Student entity are:
  - a. **RegNumber:** It stores the Registration Number of the student which is a unique identity given to a student by board. The current format of the Registration Number is XX-XX-RYY-XXXX where X is a Number from 0 to 9 and YY represent Year. The First Block represents the Institute Code, The Second Block represents the Institute, YY represents the year and last four digits represent the unique number.
  - b. **ApplicationNumber:** An automatically generated number whenever a new student registers in the system. (This Feature will be used in the next phase of the system).
  - c. **PWD:** Person With Disability, An important attribute because in theory subjects for students having Disability, the pass percentage is 33% instead of 40%.
  - d. **IsVerifiedByInstitute**

- e. *IsVerifiedByBoard*
- f. *FirstName, MiddleName and LastName*
- g. *FatherFirstName, FatherMiddleName, FatherLastName*
- h. *MotherFirstName, MotherMiddleName, MotherLastName*
- i. *Gender*
- j. *InstituteID*: It links the student with the institute he/she is studying in.
- k. *ProgrammeID*: It links the student with the programme he/she is registered in.
- l. *Scheme*: (Possible Values: *NEW* and *OLD*)
- m. *CurrentSemester*: (Its Value represents the max semester the student is registered in).
- n. *Date Of Birth*
- o. *FatherQualification, FatherOccupation, MotherQualification, MotherOccupation, FamilyAnnualIncome, FatherPhoneNumber*: (Stored for information purpose only)
- p. *Category ID*: It Links the student with the category
- q. *Date Of Registration*
- r. *Date Of Admission*
- s. *Phone Number, Secondary Phone Number, Email ID, Aadhar*
- t. *RegFeePaymentMethod, RegFeePaymentStatus*
- u. *MarksTenth, MaxMarksTenth, YearTenth, BoardTenth*: (For Admission Purpose)
- v. *AdmissionBy, AdmissionNotificationNo, AdmissionNotificationDate*
- w. *SelectionRank, SelectionCategoryID*
- x. *IsLateral*: for laterally admitted students who get admission directly in 3<sup>rd</sup> Sem
- y. *IsFatherGuardian*: Used in case a student is being taken care other than Father. then The Guardian Table Comes into picture.

## 2. PICTURE:

- a. **RegNumber**: It is Linked to Student.RegNumber
- b. **Thumb**
- c. **Photograph**
- d. **Signature**

## 3. Guardian ,

## 4. Address,

## 5. District

## 6. Institute:

- a. *InstituteID*: A format of kind *GR01100013*, wherein
  - i. *First Character stands for Govt(G) or Private(P)*
  - ii. *Second Character Stands for Rural(R) or Urban*
  - iii. *3<sup>rd</sup> and 4<sup>th</sup> Character as 01 as the StateCode*
  - iv. *5<sup>th</sup> Character =1 for Polytechnics and 0 for ITI*
  - v. *Then the last 5 digits the institute codes*

*Institute2DigitCode* , *InstituteName* , *InstituteEstbYear* ,  
*InstituteType(Govt/Private), InstituteSection(Polytechnic/ITI)*  
*InstituteLocality(Urban/Rural), InstituteAddress, InstitutePinCode*

## 7. Branch

- a. *BranchID* , *BranchName* and *IsEngineering*: The BranchID is a 4 Character String

## 8. Programme:

- a. *ProgrammeID*: 5 Character String
- b. *Programme2DigitCode*
- c. *ProgrammeName*
- d. *BranchID* : It Links it the the branch
- e. *Duration* and f. *Evaluation pattern*

**9. Subject:**

- a. **SubjectID:** A format of kind **ARCH1502OCX** where the first 5 characters mostly represent the programme code, 6<sup>th</sup> character represents the semester, next 2 digits the subject code then last three characters represent New(N)/Old(O), Compulsory(C)/Elective(E) and Is this Subject Shared (S)/Not(N)
- b. **SubjectName**
- c. **SubjectAbb (3 Character Abbreviation for representing the Subject in various reports)**
- d. **SubjectScheme**
- e. **HasPractical, HasSessional, HasTheory :** Check the applicability of the component
- f. **PracticalMarks, TheoryMarks, SessionalMarks**
- g. **IsCompulsory:** C for Compulsory or Elective Number
- h. **SubjectSemester**
- i. **IsShared**
- j. **IsProject:** This Attribute is very important because the pass percentage in case of project is 50% instead of normal 40% in other Subjects.

**10. InstituteProgramme:** This entity links the institutes with the respective programmes they are offering

- a. **ProgrammeID**
- b. **InstituteID**

**11. SubjectProgramme:** This entity links the subjects with the programmes they are part of.

- a. **SubjectID**
- b. **ProgrammeID**

**12. CodeRegister:** This entity is very important owing to its storing the answerscript details.

- a. **CodeFirst and CodeLast:** The two attributes specifying the range of Answer Script Codes.
- b. **Semester, SubjectID**
- c. **EvalID**— It Links to the Evaluator who is assigned this Code Range for evaluation
- d. **Status:** This is a preliminary Status: with 0 representing Marks Not Submitted, 1 for Marks Submitted but Not Verified and 2 Represents Marks Verified.
- e. **AssignDate and SubmissionDate**
- f. **OperID:** It Links to the Operator who is assigned for re-entry . **The Marks are to be entered to prevent any kind of data entry errors . This is for the integrity Check. An Extra Effort and Space to reduce errors.**
- g. **FinalStatus:** 0 means not assigned Second Operator, 1 represents Operator Assigned but data not entered , 2 represents DataEntered , 3 Represents a mismatch between data entered by evaluator and Second operator and is being submitted to registrar for updation, 4 means registrar has updated and is pending for verification , 5 means Verified and Confirmed and ready for Decoding.
- h. **ConfirmedBy**
- i. **CheckerID:** The One Who Physically checks the answer scripts for errors in miscalculations.
- j. **Decoder1st and Decoder2nd:** The DecoderIDs Assigned for decoding. Again the process is repeated twice to ensure the integrity and error free data entry.
- k. **DecodingStatus1st and DecodingStatus2nd:** 0 represents Decoder not Assigned , 1 represents Decoder Assigned but not submitted and 2 represents the submission status.
- l. **VerificationStatus:** 0 represents not verified and 1 represents data verified.

**13. CodeMarks**

- a. **CodeNumber:** the Six Digit Code Number of the Answer Script
- b. **Marks:** Marks Entered by Evaluator
- c. **ChangeID:** EvaluatorID who updates Marks, It can also contain Deputy Registrar ID also if he updates the marks during preliminary verification
- d. **ConfirmMarks:** Marks as entered by Second Operator for Re entry
- e. **ConfirmMarksChangeID:** Operator Id for Re-Entry Operator

14. **DecodeRegister**

- a. **CodeNumber**: the Six Digit Code Number of the Answer Script
- b. **SubjectID**: It Links the Code with Subject
- c. **RollNumber**: The Actual Roll Number on the answer script
- d. **DecoderNumber**: Decoder Number (1<sup>st</sup>/2<sup>nd</sup>)
- e. **Status**: Linked to Result or not(L or NULL)

15. **Result Detailed:**

- a. **RegNumber**
- b. **RollNumber**
- c. **SubjectID**
- d. **SessionID**
- e. **Component** : (Values: Theory, Practical or Sessional)
- f. **Marks**: Actual Marks Obtained
- g. **MinMarks**: Minimum Pass Marks in the component for the Subject
- h. **IsClear**: Is the Component Passed or Not(Y/N)
- i. **CodeNumber**: Linked Code Number from CodeMarks/DecodeRegister

16. **ResultFinal**

- a. **RegNumber**
- b. **Semester**
- c. **SessionID**
- d. **RollNumber**
- e. **MarksObtained**
- f. **MaximumMarks**
- g. **Result**
- h. **Scheme**
- i. **Remarks**

17. **Registration**

- a. **RegNumber**
- b. **RollNumber**
- c. **Semester**
- d. **SessionID**
- e. **RegStatus**: (REGIS/UNREG)

18. **Operator**

- a. **OperID**
- b. **OperName**
- c. **OperDesig**: Designation of the operator
- d. **OperContact**: Phone Number of the Operator
- e. **OperInstituteID**: The Department/Institute of the operator
- f. **OperRole**: The Role of the operator

19. **UserAccount**

- a. **UserName**
- b. **Password**: Stores as md5 of actual password
- c. **Role**: Values: ADMIN, EVALT, OPERT, DECOD, DYREG, REGIS, SECURY

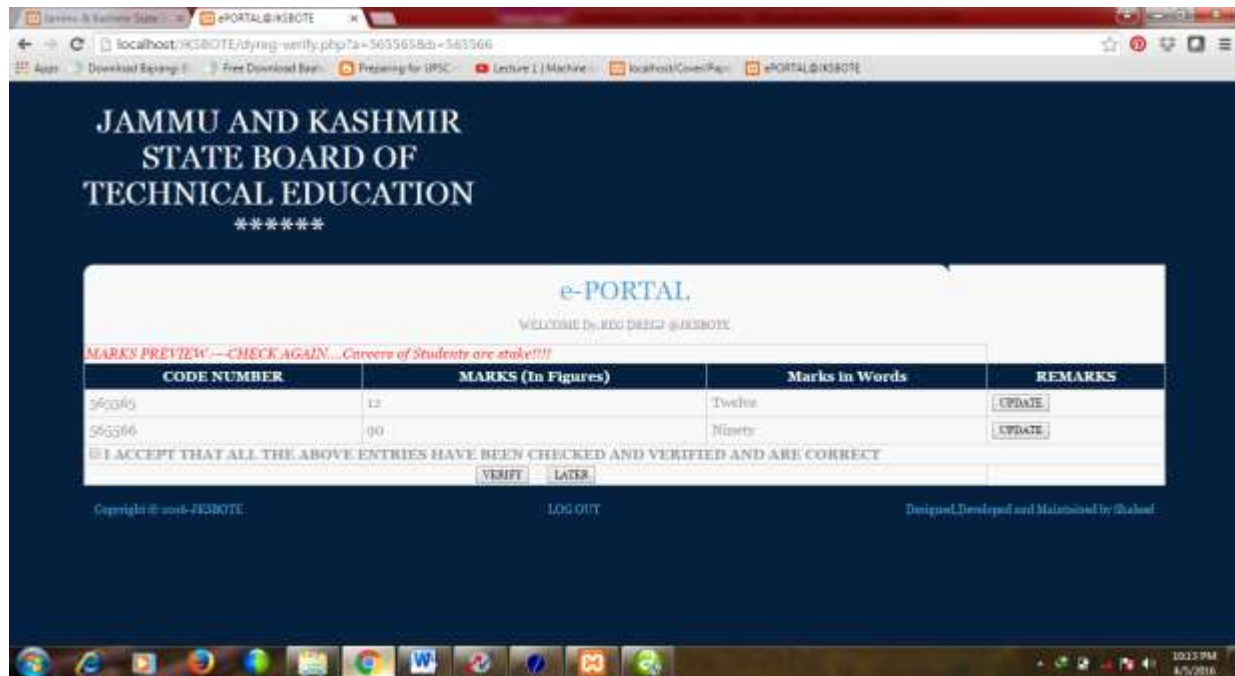


Fig.1:Award Roll Verification

### EVALUATOR:

The role of evaluator is to evaluate and then enter the marks into the system. Every evaluator has unique username and password and an evaluator can enter marks against code numbers of those answer scripts which have been assigned by deputy registrar. The home page of Evaluator shows all the packets that have been assigned to Evaluator. After entering the marks, the evaluator gets an automated award roll generated and signs the same and submits it.

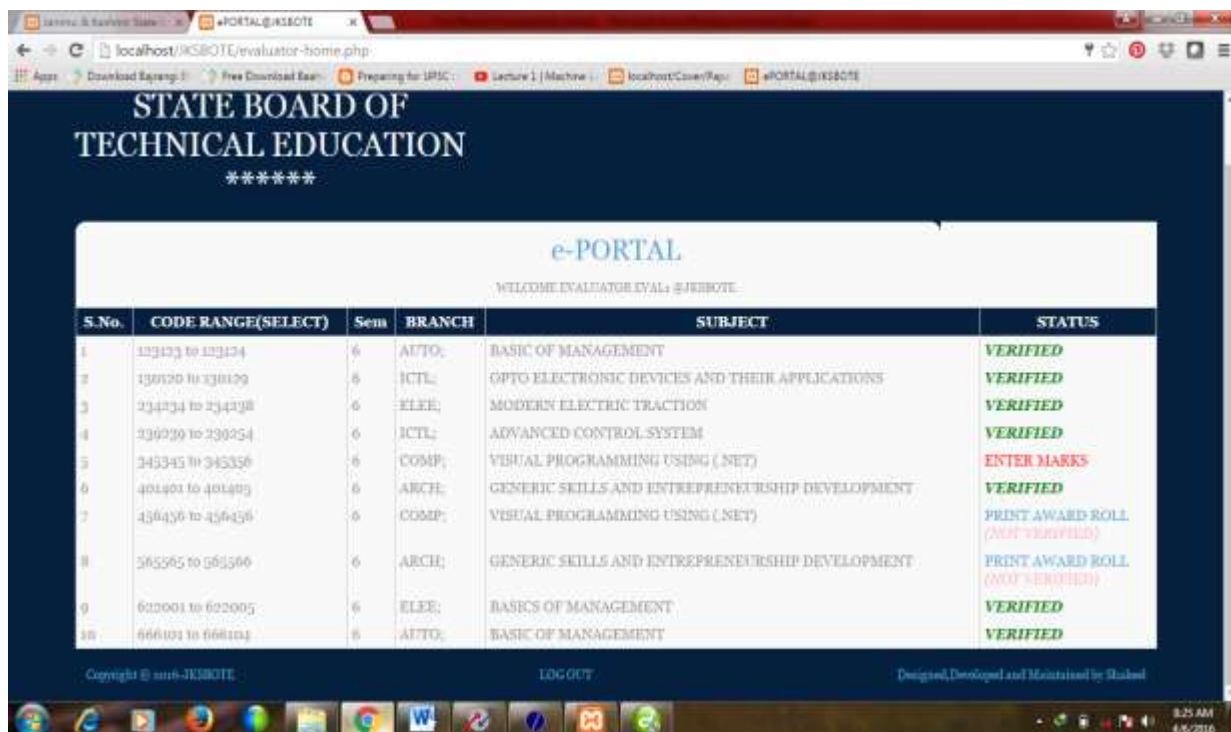


Fig.2:Evaluator Home Page.

**e-PORTAL**  
WELCOME OPERATOR EVALUATOR @KSBOTE

**WARNING!!! BE VERY CAUTIOUS WHILE ENTERING THE MARKS... Careers of Students are stake!!!**

CODE NUMBER	MARKS OBTAINED
345345	<input type="text"/>
345346	<input type="text"/>
345347	<input type="text"/>
345348	<input type="text"/>
345349	<input type="text"/>
345350	<input type="text"/>
345351	<input type="text"/>
345352	<input type="text"/>
345353	<input type="text"/>
345354	<input type="text"/>
345355	<input type="text"/>
345356	<input type="text"/>

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Fig.3:Evaluator Entering Marks

**e-PORTAL**  
WELCOME EVALUATOR EVALUATOR @KSBOTE

**MARKS PREVIEW!!!—CHECK AGAIN... Careers of Students are stake!!!**

CODE NUMBER	MARKS (In Figures)	Marks in Words
345345	10	Ten
345346	20	Twenty
345347	30	Thirty
345348	40	Forty
345349	50	Fifty
345350	60	Sixty
345351	70	Seventy
345352	80	Eighty
345353	90	Ninety
345354	100	One Hundred
345355	10	Ten
345356	20	Twenty

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Fig.4: Evaluator Marks Preview page before final submission.

**J&K STATE BOARD OF TECHNICAL EDUCATION**  
THEORY AWARD ROLL - (Nov-Dec 2018)

SEMESTER: 6  
Subject: VISUAL PROGRAMMING USING (NET)  
Branch: COMP  
Max Marks: 100  
Minimum Pass Marks: 40

CODE	Marks		RESULT
	Figures	Words	
345345	10	Ten	FAIL
345346	20	Twenty	FAIL
345347	30	Thirty	FAIL
345348	40	Forty	PASS
345349	50	Fifty	PASS
345350	60	Sixty	PASS
345351	70	Seventy	PASS
345352	80	Eighty	PASS
345353	90	Ninety	PASS
345354	100	One Hundred	PASS
345355	10	Ten	FAIL
345356	20	Twenty	FAIL

Total Number of Students: 12  
Number of Students Passing: 7  
Failing: 5

Evaluator ID: EVAL1  
Name: SHAKEEL AHMAD  
DAR (Lecturer)  
Contact: 9897311826

Checker ID:  
Name: ( )  
Contact:

Signature of Evaluator  
Signature of Checker:

Fig.5: Award Roll Generated of Evaluator.

The Final Result Register looks like

**3-YEAR DIPLOMA IN Architecture Assistantship**

Roll Number Prev. Roll Number Reg Number	Name Parentage	EL-1 Th Se 100 25	GSE Th Se 100 25	BOM Th Se 100 25	SSD Th Se 100 25	MPW Se Pr 100 100	SCA Se 100	TOTAL	Sem. 1 Marks Total Roll Number	Sem. 2 Marks Total Roll Number	Sem. 3 Marks Total Roll Number	Sem. 4 Marks Total Roll Number	Sem. 5 Marks Total Roll Number	REMARKS
1506-15D6-00991 1506-15M6-1720 15-06-R12-0108	ARIF HUSSAIN GULAM HUSSAIN (D)	46 13	44 19	50 15	40 15	75 *	22	679/1150 1506-13J1-5175	NC	NC	NC	NC	NC	*=Apprenticing NC=Not Complete Result Unavail.
1506-15D6-00991 1506-15M6-1728 15-06-R12-0120	RITESH DHARM PAUL (D)	40 14	46 17	41 16	* 16	75 *	23	NC	NC	NC	NC	NC	NC	*=Apprenticing NC=Not Complete Result Unavail.
2706-15D6-01001 2706-15M6-1741 27-06-R12-0124	HONEY SAMBYAL RAJ GOPAL (D)	46 21	40 21	82 21	55 21	89 *	21	NC	NC	NC	NC	NC	NC	*=Apprenticing NC=Not Complete Result Unavail.
2706-15D6-01002 2706-15M6-1742 27-06-R12-0128	NITASHA VERMA GOPAL LAL VERMA (D)	51 23	44 23	62 23	44 23	93 *	22	723/1150 2706-12N1-1973	638/1100 2706-14D2-2191	607/1050 2706-14D3-6254	701/1075 2706-14M4-4312	NC	NC	*=Apprenticing NC=Not Complete Result Unavail.
2706-15D6-01003 2706-15M6-1743 27-06-R12-0131	ASHU KUMAR HARBANS LAL (D)	41 22	40 23	56 23	* 22	89 *	22	NC	NC	NC	NC	NC	NC	*=Apprenticing NC=Not Complete Result Unavail.
2706-15D6-01004														

Fig.6:Final Result Register

### **Conclusion**

The project started with an idea and it has been successfully implemented for the polytechnic sector of Jammu and Kashmir. The portal was designed for a very basic purpose for maintaining student data like –mid marks, semester grades, CGPA, SGPA, personal data, attendance and faculty data in a dynamic manner. The portal was programmed using simple and livid codes. The portal is provided with an admin login for updating the student and faculty information time to time. The portal eliminates the paper work which could lead to loss of data and data redundancy. The portal is enables its users to access, manage and update his/her data effectively and efficiently. It allows for a centralized facility that can easily be modified and quickly shared among multiple users. Having a web based front end removes the requirement of users having to understand and use a database directly, and allows users to connect from anywhere with an internet connection and a basic web browser. It also allows the possibility of queries to obtain information for various surveys. Due to the many users reading and modifying student data in the department, it is an ideal use for such a system.

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