**3: SYSTEM’S ANALYSIS AND DESIGN**

**3.1: The Systems Architecture**

A diagram depicting the proposed system is as below.

**Safaricom & bank System**

**School system web site**

Banks systems

Payment details

Payment request

**3.2: System and User Requirements Specifications**

Fee items balances, receipt, invoice,

Payment details

Fee items balances, receipt, invoice,

Payment details

Fee items balances, receipt , invoice details,

**Note:**

**Payment details**: Mpesa Code, Bank code, Date, Time, Phone, Guardianname, Pupilname, Amount.

**Payment request (to banks systems)**: Date, Time, Guardianname, Pupilname, Paybill No, Account no, Amount.

**Payment request (to school system)**: Date, Time, Guardianname, Pupilname, Paybill No, Account no, Amount, {distribution of Amount to fee items i.e. item name, amount}.

Payment request,

Fee items & balance request

**Website User (manager, guardian)**

Fee items & balance request, reports request

Payment request,

Fee items balance request

**Mobile Phone User (manager, guardian)**

Payment details

Payment request

Short Code APIs

MPesa APIs

Application

Database

**Users of the System**

The users of the system shall be the school’s personnel (e.g. manager), and the guardian.

**System Specifications**

The application should be accessible though the mobile phone via the short service technology (to both the manager and guardian) and also via the web.

**User Requirements Specifications**

The system should enable the manager through his/her mobile phone or via the web to;

* Add a new pupil’s details.
* Add a new guardian’s details.
* Update details of a pupil’s.
* Update details of a guardian.
* Add details of a fee item.
* Update details of a fee item.
* Send fee reminders to parents by simply giving a command.
* Generate the following reports;
	+ A list of pupils with fee balances (showing also the total amount due and their guardians).
	+ Total amount of fee paid in a duration for each fee item, and the grand total.
	+ Total amount of fee paid in a duration into each bank (using PayBill).
	+ Total amount of fee paid each month.
	+ Classes list (list of pupils in each class).
	+ Guardians list (and their contacts, phones)
* eee

The system should enable the guardian through his/her mobile phone to;

* Make a fee payment:
	+ He/she should select the fee items to pay for and the amounts, and consequently the system computes the total amount to be paid, before the payment is effected.
	+ A fee payment receipt is generated.
* Generate reports on his/her fee payment.
	+ Fee payment status report: Showing fee paid for each item, and the fee balance for each item.
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**3.3: Web Site Design**

**3.4: Database Design**

**Entities and Attributes**

Pupil (PupilAdmNo, NemisNo, DateOfBirth, Class, GuardianIdNo, TransportMode, TransportZone, TransportDoorToDoor, TransportLocation)

Transport (TransportZone, TransportPlaces, TransportCharge)

Guardian (GuardianIdNo, GuardianName, GuardianPhone, GuardianHome, GuardianEmail, SpouseName, SpousePhone, SpouseEmail)

FeeItem (FeeItemNo, FeeItemName, FeeItemFrequency, FeeItemMandatory, FeeItemAmount)

FeePay (FeePayCode, PayDate, PupilAdmNo, FeePayAmount, PaidBy, MPesaCode, PayBill)

FeePayItem(FeePayCode, FeeItemNo, Amount)

**ERD**

Transport

TransportZone

GuardianIdNo

Guardian

Pupil

PupilAdmNo

FeePay

FeePayCode

FeeItemNo

FeeItem

FeePayItem

**Data Dictionary**

**(i) Pupil Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **ShortName**  | **Type** | **MaxSize** | **Constraints** |
| Pupil’s admission number | PupilAdmNo | String | 20 | Primary Key |
| Pupil’s Nemis number | NemisNo | String | 30 | Not null. Unique |
| Pupil’s birth date | DateOfBirth | Date/time | Short | Not null |
| Pupil’s class | Class | String | 5 | Not null |
| The IDNO of guardian (or passport number) | GuardianIdNo,  | String | 30 | Not null. Foreign key (References Guardian) |
| The mode of transport to & fro school | TransportMode | String | 10 | Not Null. Possible Values: Private, Morning, Evening, Full |
| The area (zone) of picking/dropping by school bus | TransportZone | String | 50 | Optional |
| If door to door transport services given to pupil | TransportDoorToDoor | Boolean | 3 | Optional |
| Exact location pupil is picked/dropped | TransportLocation | String | 50 | Optional |

**(ii) Transport Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **ShortName**  | **Type** | **MaxSize** | **Constraints** |
| The zone | TransportZone | String | 20 | Primary Key |
| List of specific areas/places included in a zone | TransportPlaces | String | 400 | Not null |
| The fee charged for the zone | TransportCharge | Currency |  | Not null |

**(iii) Guardian Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **ShortName**  | **Type** | **MaxSize** | **Constraints** |
| IdNo of pupil’s guardian (or passport no) | GuardianIdNo | String | 30 | Primary key |
| Guardian’s name | GuardianName | String | 30 | Not null |
| Guardian’s phone | GuardianPhone | String | 20 | Not null |
| Guardian home details (home location, emergency contacts, etc) | GuardianHome | String | 100 | Not null |
| Guardian’s email | GuardianEmail | String | 30 | Not null |
| Guardian’s spouse name | SpouseName | String | 30 | Not null |
| Guardian’s spouse phone | SpousePhone | String | 20 | Not null |
| Guardian’s spouse email | SpouseEmail | String | 30 | Not null |

**(iv) FeeItem Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **ShortName**  | **Type** | **MaxSize** | **Constraints** |
| Fee item no | FeeItemNo | String | 20 | Primary key |
| Fee item name | FeeItemName | String | 30 | Not null |
| Frequency (e.g. once, per term, per year) | FeeItemFrequency | String | 20 | Not null |
| If mandatory | FeeItemMandatory | Boolean | 3 | Not null |
| Amount charged for the fee item | FeeItemAmount | Currency |  | Optional |
| The MPesa PayBill no  | PayBill | String | 20 | Optional |

**(v) FeePay Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **ShortName**  | **Type** | **MaxSize** | **Constraints** |
| Code of fee payment transaction | FeePayCode | String | 20 | Primary key |
| Fee payment date, time | PayDate | Date/time | Long | Not null |
| Pupil’s admission no | PupilAdmNo | String |  | Not null. Foreign key (references Pupil) |
| The total amount paid in the transaction | FeePayAmount | Currency |  | Not null |
| The person (usually paying phone) paying | PaidBy | String | 30 | Not null |
| Code of MPesa transaction | MPesaCode | String | 30 | Optional |

**(vi) FeePayItem Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Field** | **ShortName**  | **Type** | **MaxSize** | **Constraints** |
| Fee payment code | FeePayCode | String |  | Not null. Foreign key (references FeePay) |
| The fee item paid for | FeeItemNo | String |  | Not null. Foreign key (references FeeItem) |
| The amount paid | Amount | Currency |  | Not null |

**3.5: Application Design**

**Use case Diagrams**

**Modules Design**

Main menu

Fee Pay

Fee Pay

Help

Fee Pay

Check fee balance