

Design and Implementation of LRS – A case study

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ABSTRACT

Land Records System (LRS) is used to store ownership and boundary information of lands. Municipal Corporation uses this information for tax collection. Land records maintained on paper / cloths have preservation, updating and retrieval problems. Computerization is natural solution for all these problems. In the present paper we have designed and implemented an LRS, taking example of district Hamirpur of Himachal Pradesh. Access 2000 is used as medium for implementation. The design of LRS is further extended to nationwide LRS and nationwide information system. The nationwide information system is supposed to satisfy the needs of district administration, state and central governments.

1. Introduction

In India land records are maintained by district administration for deciding ownership and boundaries of land or property. The process of defining and determining land in favour of an owner is called registry of land. Municipal Corporation also uses the ownership information for tax collection. All land disputes come under the charge of Tahsildar, Naib Tahsildar, Kanungo and Lekhpal (Patwari). These officials assist Collector in resolving land disputes. Land records maintained on paper or cloth has preservation, updating and retrieval problems. Computerization is natural solution for all these problems. The government of India has already

taken initiatives to computerize land records in the country. According to [1] computerization scheme was started in 1988-89 and extended further in phased manner throughout the country. At present the scheme is implemented in 544 districts leaving only those districts where there are no land records. So far the progress is concerned only five districts have completed computerization and Records of Right (ROR) are being issued to landowners. According to TV (television channel DD1) news Karnataka state has completed computerization of all land records in the state.

In the present paper we have designed and implemented Land Record System (LRS) by taking specific case of district Hamirpur of Himachal Pradesh. The design of LRS is extended to convert it into nationwide LRS and nationwide information system.

2. Need of Nationwide LRS

Land related terminology used by common man in India varies throughout the country. Land records maintained manually have different formats and use different terms to convey same information. Therefore, there is need to develop a uniform terminology and generalized database schema for land records, however the region specific local terms can be used for displaying information. Thus the backend of the database will have common structure whereas front-end will depend on region specific terminology / language. Traditionally, an LRS is used to store ownership information and for tax collection purpose, however the same database can also be extended to include information satisfying the needs of district administration, state and central governments. The relevant information like population, soil type, crop information, literacy, sex ratio, rainfall, industrial, bank, transport etc. can be included in extended database. This new extended system may be considered as nationwide land record system / nationwide information system. The accessibility of this nationwide system through Internet will not only introduce transparency in government functioning but also solve a number of land dispute problems. The same system can also be extended for on-line sale and purchase of land or property through Internet.

3. LRS and its Extension – A Case Study

A study of LRS maintained manually for district Hamirpur of Himachal Pradesh was made and it was found that most of the terms used in land record register are derived from Urdu language. The following terms were in use: -

Number khewat ya jamabandi, Number khatoni, Naam nambardar, Naam maalik va ehwaal, Naam kashkaar va ehwaal, Naam chah va deegar, Number hai khasra, Raqba harkhet va meejaach, Lagan jo mujara adaa karta hai, Hissa ya paimana haqiyat, Mutalba va sharah muamla, Kaifiat. (A brief explanation of these terms is given in Appendix 1)

There was no criterion of arranging records in the register. A number called A/C No. is given to each new record as it is entered in the register. All other information of the record is associated with A/C No. The format of land records as used in register after converting Urdu terms with their equivalent terms in English is shown in Table 1.

Table 1: Land record data as written in register

A/C no.	Sub A/C no.	Revenue Collector data	Owner data	Cultivator data	Source of Irrigation	Plot no.	Area		Rent paid by cultivator	Govt. revenue rate	Revenue paid	Remarks
							In Beeghas Metric	In				
1	2	3	4	5	6	7	8	9	10	11	12	
-	-											

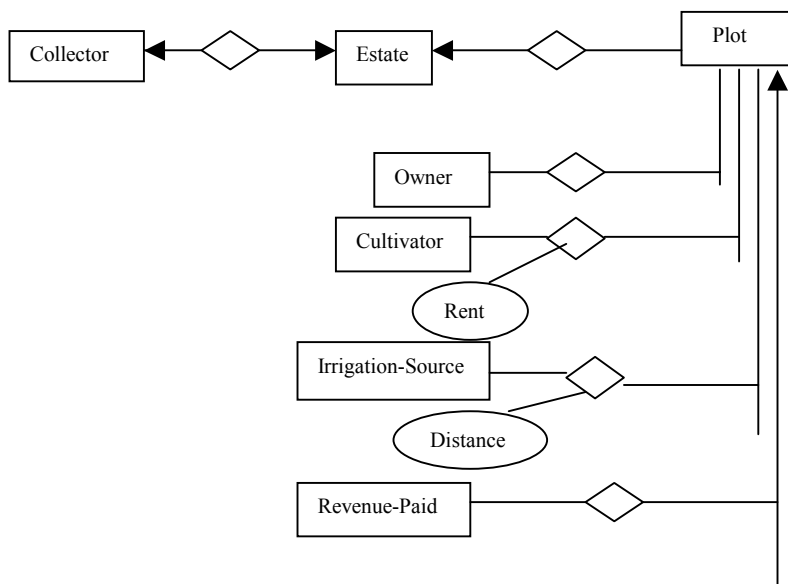
After having a careful study of land record data the following seven entities of interest were identified: -

Collector, Owner, Cultivator, Irrigation-Source, Plot, Revenue-Paid, Estate

(a brief explanation of entities with their attribute level description is given in Appendix 2)

The old record (i.e. land record maintained manually in register) information like Account Number and Sub Account Number are added as attributes in the entities Owner and Cultivator. These attributes will help in tracing the old land records in register from computerized LRS.

The ER diagram as shown in Fig.1 explains the relationships among entities [23]. To provide clarity of expressiveness only entities and attributes of relationships are shown in ER diagrams (Fig.1 & 4). See Appendix 2 & 3 for attributes of entities.



(Fig. 1 ER diagram of LRS for district Hamirpur HP)

In order to develop nationwide LRS, there is need to develop a uniform addressing mechanism to a plot. The conventional hierarchical addressing used to refer a plot in different regions of the country is shown in Fig.2. In Fig.3 the same conventional hierarchy is shown except the general terms Division1 and Division2 are

used in place locally used terms. Division2 can further be divided into smaller hierarchical units with the consultation of district and state level concerned officials. New entities of interest in the generalized nationwide LRS can be:

State, UT, District, Division-1, Division-2, Reference-Point

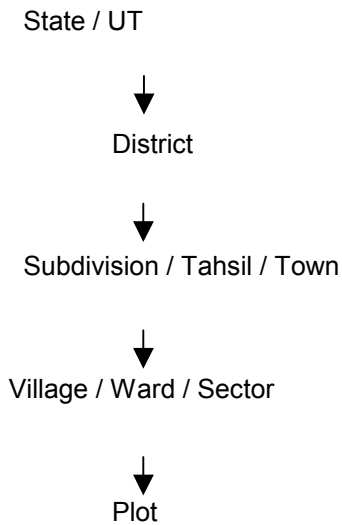
Other entities can be revised to give them generalized form as

Plot, Owner, Land-Inspector, Tenant, Irrigation-Source, Revenue-Paid

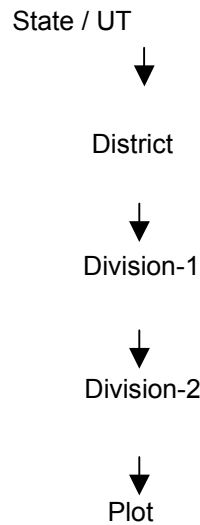
The term Land-Inspector and Tenant are used for Collector and Cultivator to give them general sense.

(attribute level description of these entities is given in Appendix 3)

ER diagram for nationwide LRS can be given as shown in Fig.4.



(Fig.2 Geographic hierarchy using conventional terminology)



(Fig.3 Geographic hierarchy using proposed terminology)

The schema proposed for nationwide LRS can be extended further to include information about basic amenities available in the town / village / district in a single database. The basic amenities can be education, health, entertainment, drinking water, bank, electricity, road, post office, telephone, highway connectivity etc. The other useful information like population, sex ratio, literacy, per man income, rain fall, crop etc. can also be included. This extended system will help district administration to have a close watch on balance development of the whole district and to convey latest data to state or central govt. for further processing. The state and central governments will use these data for macro level planning and to decide appropriate funds for various development activities. The exact structure of information for nationwide system can be decided only after consultation the requirements with district, state and central govt. level concerned officials. The entities in nationwide LRS can be extended to include new attributes required for nationwide information system, however few new entities will also be required to consider. The extension of entities to include new attributes will be as under: -

Plot Plot-Code , LandType, Area, Shape, Map, P-Location, Crop, DrinkingWater,
 ElectricityConnection, OtherData1, OtherData2,....,OtherDataN

Division-2 D2-Code , D2-Name, D2-Area, D2-Population, D2-SexRatio, D2-PerManIncome,
 D2-HighwayConnectivity, D2-PrimaryHospital, D2-Theatre, D2-School, D2-College,
 D2-BusStand, D2-Bank, D2-Postoffice, D2-telephone, D2-CropProduction, D2-RainFell,
 OtherData1, OtherData2,....,OtherDataN

Division-1 D1-Code , D1-Name, D1-Area, D1-Population, D1-SexRatio, D1-PerManIncome,
 D1-Hospital, D1-NumberOftheatre, D1-NumberOfSchool, D1-CropProduction,
 D1-RainFall, OtherData1, OtherData2, ...,OtherDataN

District D-Code, D-Name, OtherData1, OtherData2,....,OtherDataN

State State-Code ,S-Name, OtherData1, OtherData2,....,OtherDataN

UT UT-Code , UT-Name, OtherData1, OtherData2,....,OtherDataN

New entities of interest may be:

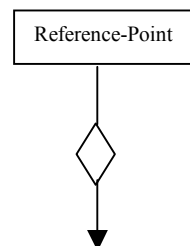
Bus Stand, Primary School, Primary Hospital, District Hospital, Regional Hospital, College, Bank, Post Office, Theatre etc.

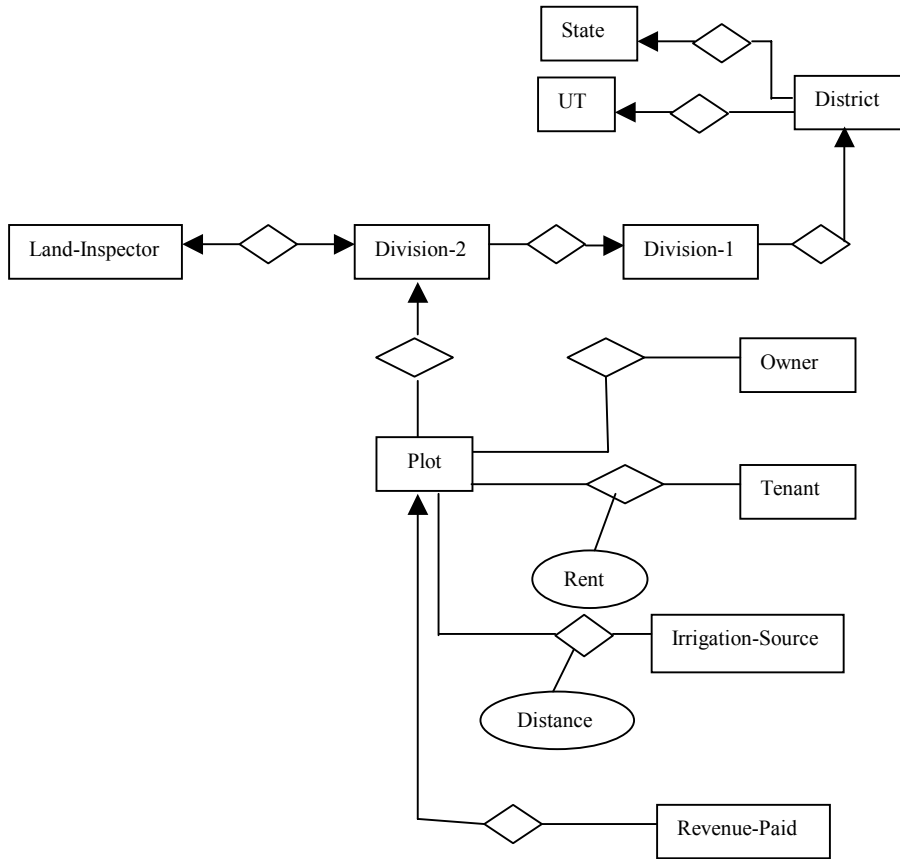
If we need to know details about entities like Hospital, Bank, College etc. then there is need to define these entities separately. If we need only the number of these basic amenities in a particular division or district then the extended entities are sufficient by providing additional attributes as yes/no values and the same ER diagram as described for nationwide LRS will also work for nationwide information system.

4. Query Classification

Ten useful queries have been identified in the case study. All queries have been implemented successfully and are listed in Appendix 4. The queries asked for an LRS will be subset of queries possible in nationwide LRS. The queries required for nationwide information system will further enlarge the list of queries. The possible classification of queries for nationwide system will be as under:

- plot specific queries
- owner specific queries
- tenant specific queries
- basic amenities related queries
- division specific queries
- district specific queries
- queries useful for state govt.





(Fig. 4 Proposed ER diagram for nationwide LRS)

- queries useful for central govt.
- queries form planning and development point of view

One interesting and most important query may be “Find all plots owned by a particular person in the whole country”. The answer of this query will expose the people having disproportionate land in favour of their names. To implement the query the owner should be identifiable at national level just like a vehicle or voter card number. Few queries for nationwide system are listed in Appendix 5.

5. Implementation

The case study made of LRS for district Hamirpur (HP) is implemented using Access 2000 RDBMS [24]. There are seven entity tables, three relationship tables (for many-to-many relationships) and ten queries in the implementation. One –to-one and one-to-many relationships are implemented using the concept of foreign key. OLE data type is used to represent map of a plot as an image. Forms are used for displaying results. Queries implemented are listed in Appendix 4. Welcome screen and results of few queries are shown in Appendix 6. Detail steps of implementation of database using Access are discussed in [20].

6. Conclusions and Future Work

Case study of LRS for district Hamirpur (HP) is implemented successfully. All queries implemented are working properly. Map of a plot is represented as an image using OLE data type. In order to make uniformity in management of land records throughout the country, the proposed nationwide LRS is very useful. The system is suggested for further extension to include information like population, literacy, soil type, crop, sex ratio, rain fall, school, hospital, bank, post office etc. This extended system can be termed as Nationwide Information System to satisfy the needs of district administration, state and central govts. The consistent structure of information can be made with the consultation of district, state and central govt. concerned officials. The system will help to the district administration to have a close watch on balance development of the district. The nationwide latest data will help the governments to make macro level planning for balance development of the country. The accessibility of the system through Internet will solve a number of land disputes generally take place in rural areas of Bihar and Uttar Pradesh. It will also provide transparency in government functioning. The system can also be converted for on line sale and purchase of land through Internet. There is need to have cooperation among various departments of government at different levels to take initiatives for developing Nationwide LRS / Information System.

In context of future work the present case study may be converted into applications as discussed in [21, 22], in context of Indian environment. At present case study implemented does not have internet

accessibility. The accessibility of database through internet can be provided by generating web pages dynamically as given in [9]. Instead of writing CGI program to generate HTML code, various forms of annotated HTML embed scripting commands included within an HTML document can be used. The popular approaches PHP, Active Server Pages, JavaServer Pages and Java Servlets are discussed in [15, 16, 17, 18]. In [6] a survey of tools required for data intensive web applications development is given. In [8] study is made showing that mod_perl, an Apache Server module can improve performance of CGI script at least 10 times by making persistent database connection. FastCGI [19] is also a solution to improve the performance of CGI.

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Appendix 1

1. Number khewat ya jamabandi- refers to account number of owner or owners which is used as key to identify a land record in the register.
2. Number khatoni- refers to sub account within account corresponding to a cultivator using plot or land.
3. Naam nambardar- refers to government employee appointed for revenue collection in the region where plot is situated. Here each region is called Estste and a no. of plots are situated in one Estate.
4. Naam maalik va ehwaal- refers to owner or owners of land.
5. Naam kashtkaar va ehwaal- refers to cultivator corresponding to each sub account.
6. Naam chah va deegar- refers to source of irrigation near to plot.
7. Number hai khasra- refers to plot number.
8. Raqba harkhet va meejaach- refers to area of plot in Beeghas and metric units.
9. Lagan jo mujara adaa karta hai- refers to rent paid by cultivator to the owner.
10. Hissa ya paimana haqiyat- refers to rate of revenue decided by authorities depending on the type of land.
11. Mutalba va sharah muamla- refers to the revenue paid.

12. Kaifiat- refers to remarks.

Appendix 2

Explanation of entities

1. Collector :- Govt. employee appointed for revenue collection.
2. Owner :- Owner of land.
3. Cultivator :- Person who cultivates the land.
4. Irrigation-Source :- Source required for irrigation.
5. Plot :- Description of land.
6. Estate :- District is divided into a no. of regions and each region is called estate.
7. Revenue-Paid :- Description of revenue paid to collector.

Attribute level description

Collector EmpCode , E-name, E-FatherName, E-GrandFatherName, E-Address

Owner O-Code , O-Name, O-FatherName, O-GrandFatherName, O-Address, AccountNo

Cultivator C-Code , C-Name, C-FatherName, C-GrandFatherName, C-Address, SubAccountNo

Irrigation-Source IS-Code , Type, I-Location

Plot Plot-Code , LandType, Area, Shape, Map, P-Location

Estate E-code, E-Name, Tahsil , District, TotalRevenue

Revenue-Paid Receipt-No , Amount, Date, PayeePerson, Remarks

Appendix 3

State State-Code , S-Name

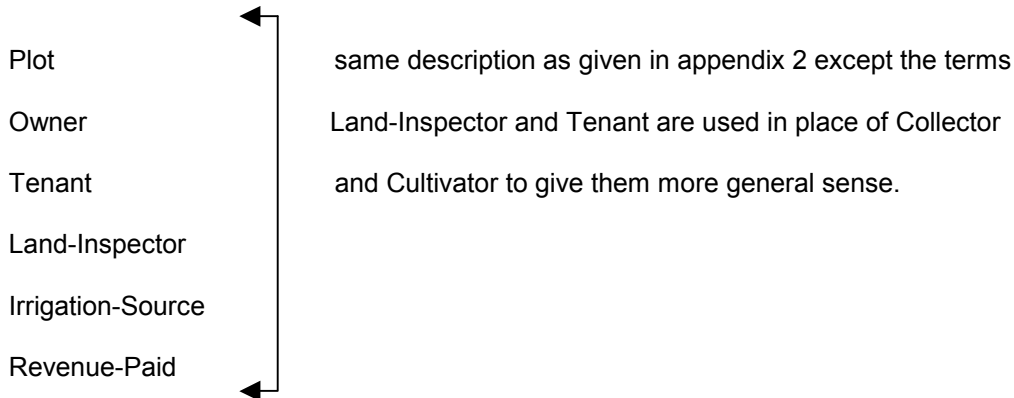
UT UT-Code , UT-Name

District D-Code , D-Name

Division-1 D1-Code , D1-Name

Division-2 D2-Code , D2-Name

Reference-Point Ref-Code , R-Name, R-Type, R-Description



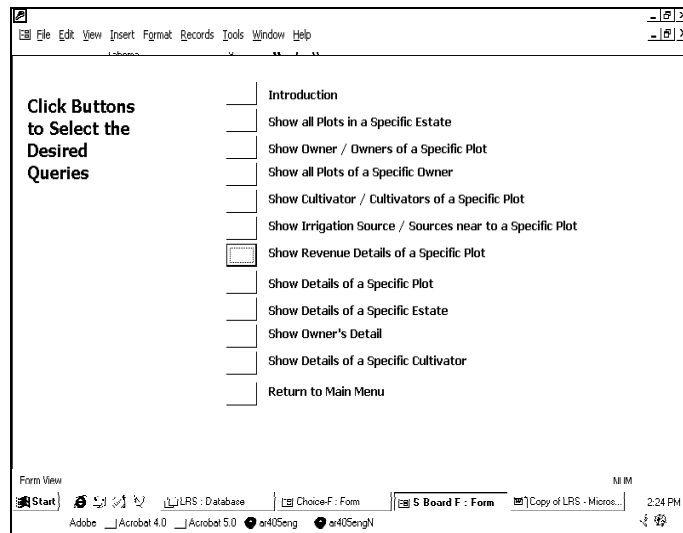
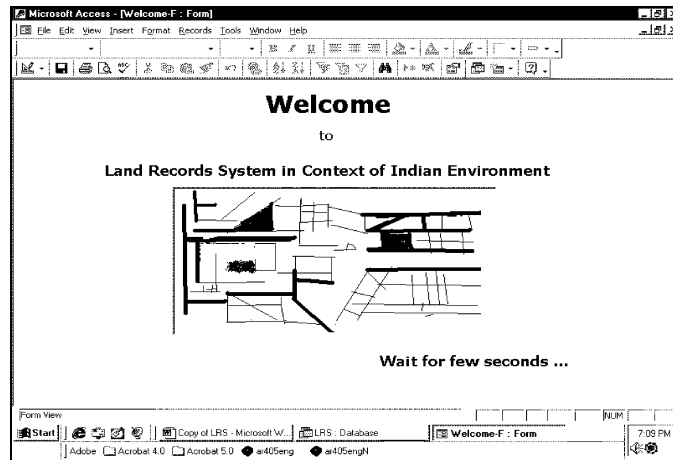
Appendix 4

1. Show all Plots in a Specific Estate.
2. Show Owner / Owners of a Specific Plot.
3. Show all Plots of a Specific Owner.
4. Show Cultivator / Cultivators of a Specific Plot.
5. Show Irrigation Source / Sources near to a Specific Plot.
6. Show Revenue Details of a Specific Plot.
7. Show Details of a Specific Plot.
8. Show Details of a Specific Estate.
9. Show Owner's Detail.
10. Show Details of a Specific Cultivator.

Appendix 5

1. How many are primary schools in a particular division / district?
2. How many are primary hospitals in a particular state?
3. Who is owner of a particular plot?
4. Which district has maximum per man income in a particular state?
5. Find all plots in favour of a particular owner in a particular district?
6. How much is land owned by a particular person in the whole country?
7. How many plots have drinking water facility in a particular division / district?
8. How many plots have electricity connections in a particular division of a district?
9. Display divisions having no banking facility.
10. Display divisions having no post office.
11. How much have state govt. earned from land revenue?
12. How many owners have given their lands to tenants for agriculture?
13. Display map of a particular plot.
14. Display rainfall level in a particular district.
15. Display all reference points in a particular district.
16. Display population of a particular district.

Appendix 6



Show All Plots in a Specific Estate

Click dropdown arrow and select the desired Estate

E-Name: [E-17-1] -

Tahsil:

District:

Plots Details

Plot.Code	LandType	Area	Shape	P.Location
▶ P-19-1-20-3	Irrigation	262.00	rectangular	Near Pratap Gali
□ P-19-1-20-1	Residential	222.00	square	Near Pratap Gali
*		0.00		

Close

Form View MIM

Start Copy of LRS - ... LRS - Database Choice F: Form S-Board F: Form U-2-F 2:58 PM

Adobe Acrobat 4.0 Acrobat 5.0 ar405enz ar405endN

Show Irrigation Source / Sources near to a Specific Plot

Selected Plot

LandType: Map [P-19-1-20-1] -

Area:

Shape:

P-Location:

Irrigation Sources

IS.Code	Type	I.Location
▶ IS-P-19-1	Pond	Near DC Office
□ IS-C-19-1	Canal	Near By Pass Road
*		

Close

Form View MIM

Start Copy of LRS - ... LRS - Database Choice F: Form S-Board F: Form R-7-F 2:12 PM

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Show Cultivator / Cultivators of a Specific Plot
Click dropdown arrow and select the desired Plot

Selected Plot

LandType: Irrigation
Area: 120.00
Shape: Irregular
P-Location: Near Upper Bazar

Close

Cultivator Detail

C.Code	C.Name	C.FatherName	C.GrandFatherName	C.Address	SubAccount
C-19-3	Ramesh	Deah Raj	Dharma Singh	22, Krishna Nagar, Hamipur	S-19-3
C-19-1	Shyam	Sohan	Siyaram	C-12, Heera Nagar, Hamipur	S-19-2

Form View

Start | Copy of LRS... | LRS: Database | Choice: Form | S-Board: Form | D-6-F | 2:13 PM

Show Revenue Details for a Specific Plot
Click drop down arrow and select the desired Plot

Selected Plot

LandType: Residential
Area: 222.00
Shape: Square
P-Location: Near Pratap Gah

Close

Revenue Collection Detail

Receipt.No	Amount	Date	PayeePerson	Remarks
A-19-29-1	300.00	2/21/98	R N Sharma	O Kay
A-19-211	200.00	12/2/98	Sohan Lal	O Kay
	0.00			

Form View

Start | Copy of LRS... | LRS: Database | Choice: Form | S-Board: Form | R-R-F | 2:13 PM

