



Janavidhi 2000

A system for web based data acquisition and consolidation of local body election results in Kerala.

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Abstract

Election to majority of the local self-government institutions in Kerala was held on 25th and 27th of September 2000, to identify the new representatives. Among the many unique features of this largest electoral exercise, the state has witnessed since its formation, was the partial computerisation of the systems for election management. The State Election Commission entrusted the challenging responsibility to the fifty member Information Kerala Mission team, just 23 days before the counting date. The consolidation of election results named 'Operation Information Kerala' (OIK) and its reporting turned out to be the first massive application of internet technology in the state for data collection and online processing. The paper briefly covers the salient features of the 'Janavidhi 2000', the application developed by the Information Kerala Mission for OIK, and its field trial.

1.0 Introduction

Elections and election management have, along with other public services, developed more in the last twenty five years than in the preceding two hundred and fifty years [Anonimus (1992)] [GPO (1992)]. The pace of change has gone hand in hand with increased automation, the advent of the internet [Anonimus (1992)] and the emergence of a professional service oriented approach to the election process as a whole. Application of computers in electoral management could be in any one of the following areas: election planning, managing, budgeting and record keeping; drawing local body boundaries; providing information to candidates, parties and voters; monitoring and disclosing campaign contributions and spending; registering voters; authenticating voters at polling sites; managing absentee voting; recording votes, counting ballots, and



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transmitting local tallies to central tallying facilities; and disseminating election results. Modern election automation process is centred around computerised voting systems using punch card, master sense, direct recording electronic sensing and internet based voting systems. Since voters could enter their votes directly into the computer, all that is required would be to organise an initial tallying at the local body locations, transferring the intermediate tally to the tallying centres and finalising the results almost immediately after the polls close. The motivations in election automation¹ might not solve all electoral problems as was evident during ballot dispute in Florida at the recent US presidential elections.² One of the major drawbacks of the computerisation of local body election 2000 was that the computerisation programme attempted data acquisition of the manual counting sheets, their tallying, transmission and consolidation only. Instead of simplifying the election management systems, this complicated the logistics and aggravated the issues in technology management considerably.³

¹ Common motivations for election automation includes: saving money; increasing the speed and efficiency of election-related tasks; increasing the speed of election results; improving the accuracy of election results; improving the ability to identify; prevent fraud; and as improving public confidence in the electoral process.

² The voting irregularities in Palm beach, Florida has been subject of extensive research at Carnegie Mellon University, UC Belkley, John Hopkins University, Harward University etc. The US commission of civil rights has also conducted extensive studies on election practices in Florida.

³ Data entry of the draft voters list was organised in various local bodies throughout the state. It would have been very convenient if this was done based on some standards using a common data entry package. The process of scrutiny of nominations and finalisation of ballot paper could have done based on this common data base of vote registration. This could have minimised OIK's field activity prior to rollout to a sizeable extent. The problems in finalising the final list of candidates, their symbols and the total size of the electorate, pushed the final verification of the masters right to the testing of Janavidi 2000 on the eve of the counting.



2.0 Materials and Methods

The process of elections [Anonimus (2000)] to the local bodies is governed by the provisions in the relevant Act and Rules⁴. The various steps involved in the election system are covered in figures 1 to 4. The 'Operation Information Kerala' (OIK) was involved in the sub-process of counting only. However, for its effective implementation the OIK had to receive inputs right from the filing of nominations (See figure 5). The election process is implemented through a highly federated organisation structure (See Figure 6) with a major chunk of the actual implementation and statutory functions being carried out through district level officers, temporarily assigned to the State Election Commission, and functioning with a high degree of local autonomy. The Information Kerala Mission had been directly interacting with the State Election Commission headquarters for finalising the electronic ballot paper sheets to be used in the application at the client side. The poor reporting mechanism of the election organisation in its federated election structure made collection of data extremely difficult. The limited resources available imposed severe restrictions on the technology choice⁵ and the infrastructure

⁴ The legal frame work of the local body elections involves the following

Type of Local Body	Legal Frame Work
Three tier Panchayat System	1. The Kerala Panchayat Raj Act 1994 (Act 13 of 1994) 2. The Kerala Panchayati Raj Act (Registration of Electors) Rules 1994 3. The Kerala Panchayati Raj (Fixing of Strength) Rules 1995
Municipality	1. The Kerala Municipalities Act 1994 (Act 20 of 1994) 2. The Kerala Municipalities (Registration of Elections) Rules 1994 3. The Kerala Municipalities (Conduct of Elections) Rules 1995

⁵ A reasonable infrastructure for the data acquisition and consolidation of election results would have involved 14 district level facilities linked by leased lines to the state head quarters with Integrated Service Digital Network (ISDN) or dial up Public Switched Telephone Network (PSTN) connections as back up. However, resource constraints forced IKM to go for a connectivity of the 14 district facilities through Virtual Private Network (VPN) (over internet established at each district head quarters through dial up) to the state level server permanently linked to the internet through a 64 kbps leased line.



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which could be established. Extremely stringent time schedule⁶ aggravated the complexities further. [Unnikrishnan,P.V, et.al. (2000)].

⁶ The schedule was as follows:

September 5	Work assigned to IKM
September 5-27	Software development, Packaging and Training of district and state functionaries.
September 6-18	Training to various levels of field personnel in batches.
September 7	District Collectors' conference and programme presentation.
September 8-27	Data collection, entry, and verification.
September 18-26	Equipment mobilisation from various departments on hire.
September 22-25	Equipment testing, quality control, and training at district centres.
September 26-27	Deployment of equipments and installation of equipments.
September 27	Testing.
September 28-29	Counting, data entry, transfer, result publication.
September 29-30	Winding up of operations and returning of equipments.

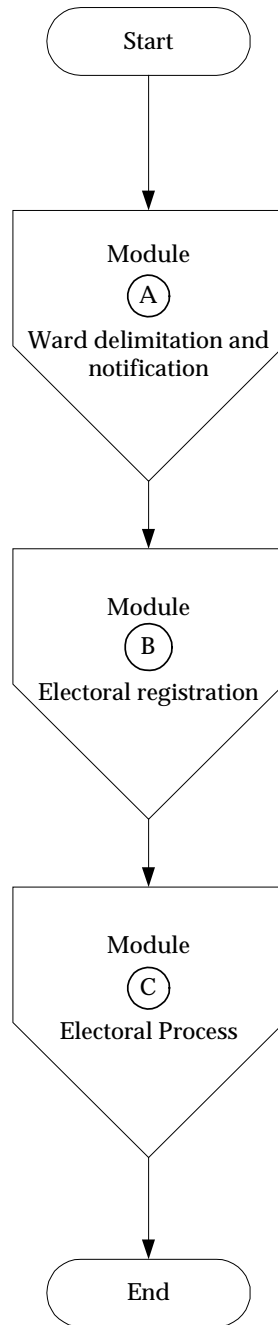


Figure 1. Electoral Process

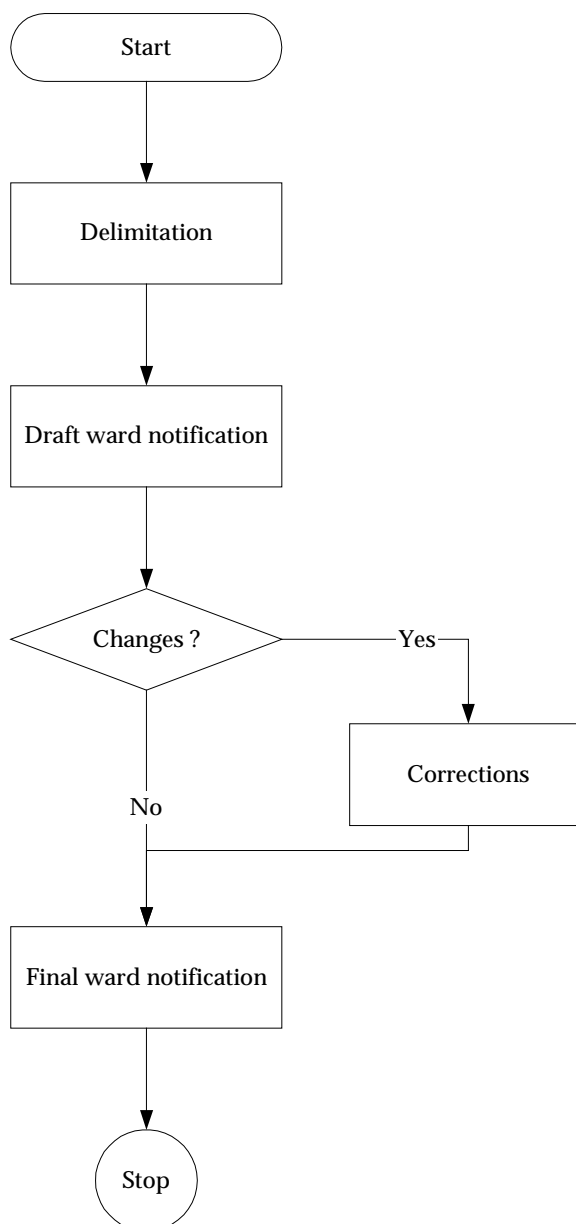


Fig 2. Module (A) Ward delimitation and notification

The scale of operations in the Kerala Panchayati Raj and Nagarapalika Election 2000 was phenomenal. See Table 1 below. The details of infrastructure mobilised for the OIK are covered in Table 2 and figure 7. The IKM team mobilised 550 technical and management personnel who were given training in various aspects of the programme including handling the application, installation, and trouble shooting.

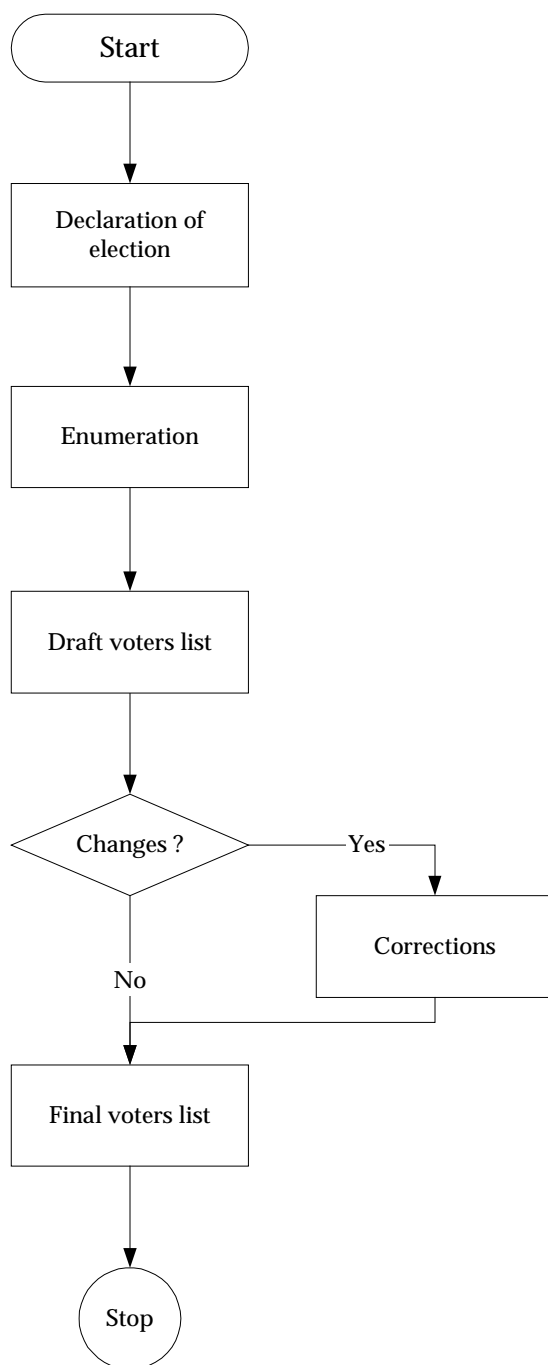


Fig 3. Module (B) Electoral Registration

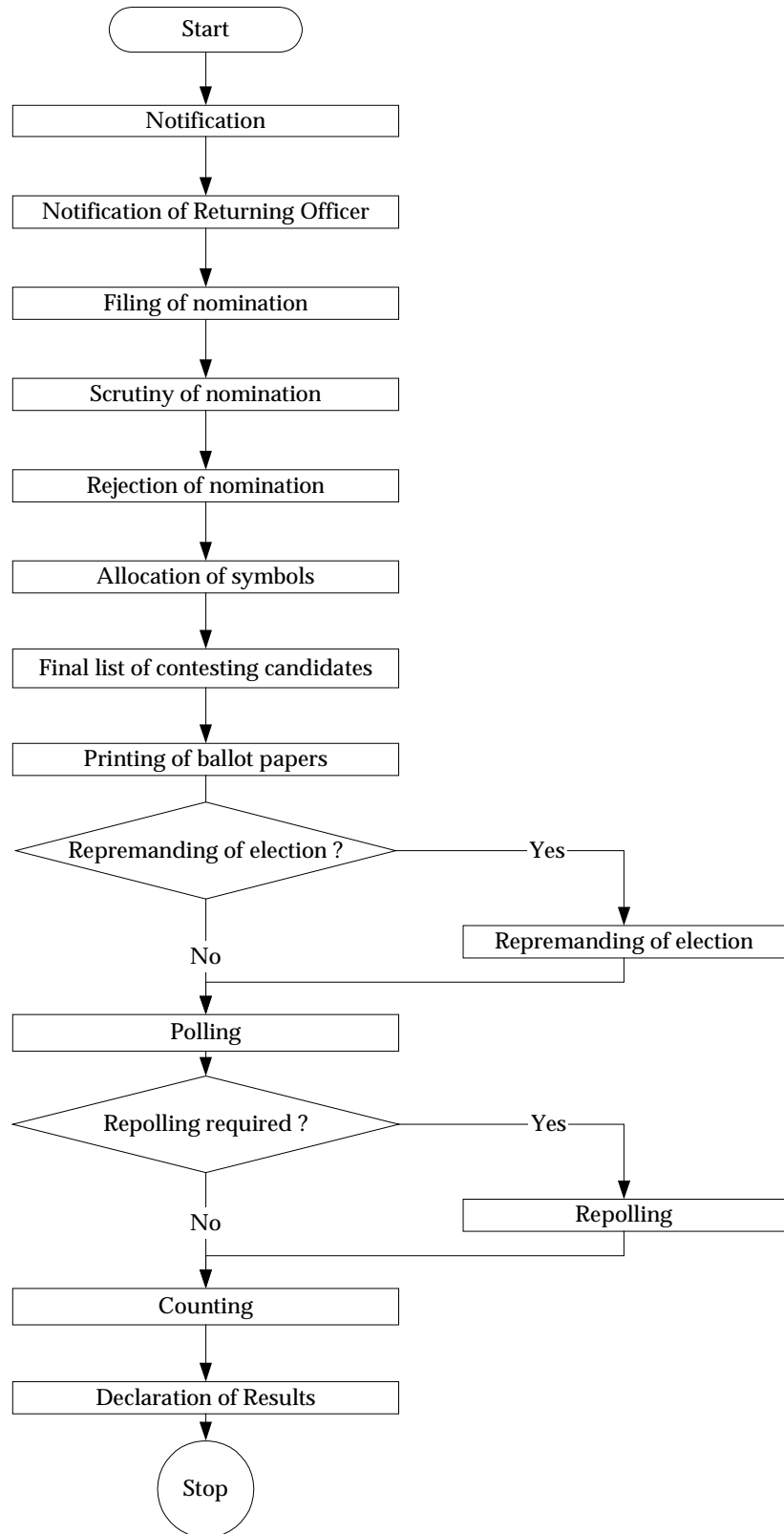


Fig 4. Module (C) Electoral Process

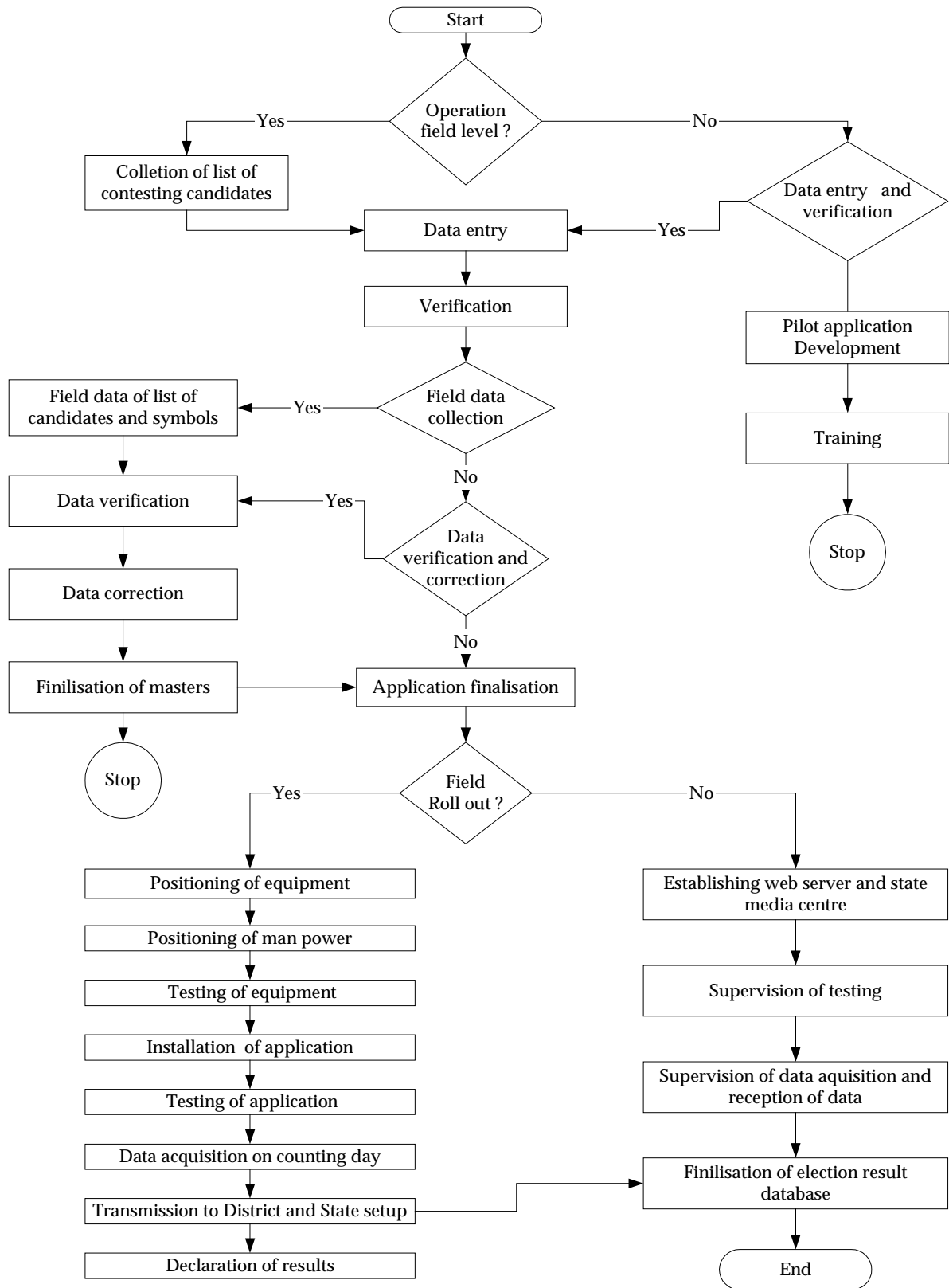


Fig 5. Operation Information Kerala - Process diagram

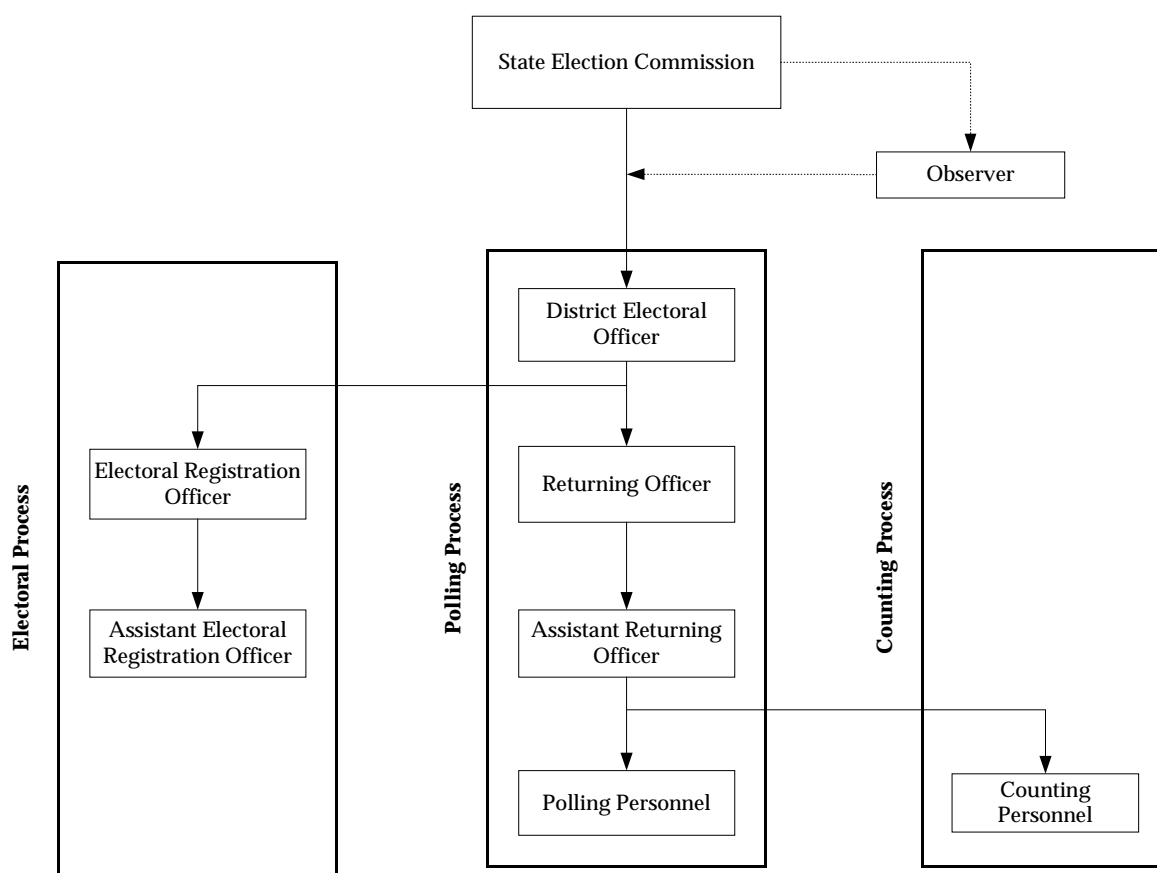


Fig 6. Election Organisation

Table 1

Salient Features of Kerala Panchayati Raj-Nagarapalika Elections 2000

Total number of local bodies	1,215
Number of local bodies to which elections were held in phase 1 ⁷	1,148
Number of constituencies to which elections were held in phase 1	16,058
Number of contestants in Phase 1	57,800
Number of polling stations	32,000

⁷ Only phase 1 was covered in OIK. However, the Janavidhi database was updated after phase 2 and phase 3.

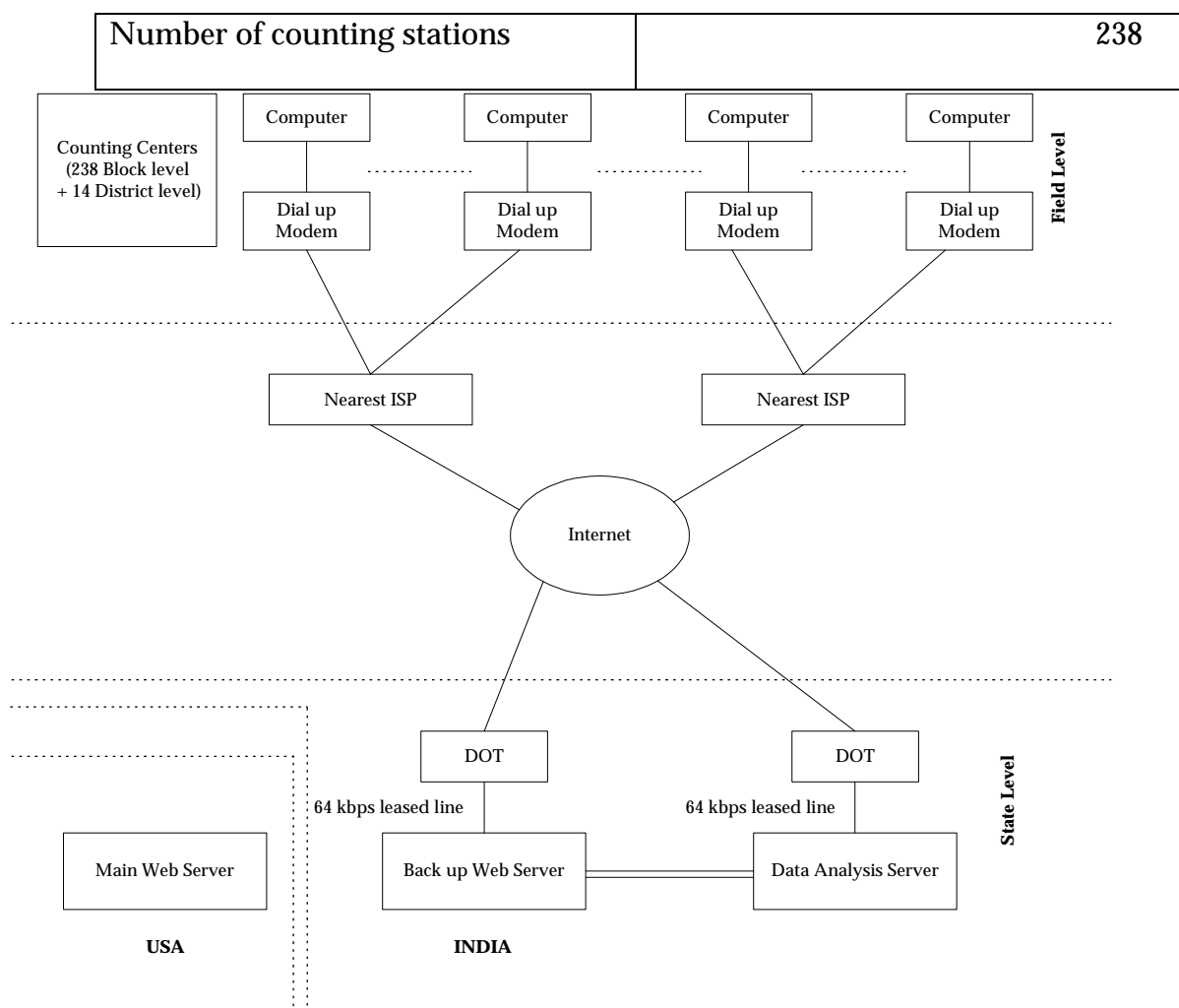


Fig 7. Operation Information Kerala - Data Connectivity

The core of the technical activities in the programme was the development and finalisation of Janavidhi 2000, the software application for data acquisition, online processing, and web based publication of results.

Since a network architecture using the internet backbone and Virtual Private Network (VPN) was fixed, the options in software design were rather limited. They were

- (1) A fully web based application where the block counting centres, district counting centres, and the State centre would use the same web application for data entry, validation, and viewing results.



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(2) A local client level application provided at the counting centres for data entry, validation, and data transfer. A separate application for viewing the results browsing the central server. [Johnson (1999)], [Ulman (2000)], [Buyens (2000)].

Table 2
Infrastructure Mobilised for the OIK

Counting Centre	1 Main client machine 1 Back up 1 Modem 1 Fax machine (back up where ever available) 1 UPS 1 casual telephone connection
District Centre	3-5 Computers 3-5 Modem 2-3 Fax machine 2-5 Casual telephone line 1-2 UPS units 3-5 Printers 1 LCD Project (Where ever available)
State Centre	5 High end server 8 PC's 2 Printers 1 10/100 mbps switch 2 Rack modems 2 64 kbps leased line connection 2 leased line modem



The first option necessitated consistent last mile connection and sustained internet connection throughout the State. Therefore the option of using a local database and an application for data entry, validation, and transfer of data from the counting centres to the State server over internet was chosen. The State server was updated regularly from various counting stations. The application was designed in such a way that the data entry errors are minimised, data integrity is ensured and network traffic is maintained at the bare minimum. This was achieved by creating a set of master details, which are provided in Table 3.

Table 3
Set of Master Details

Name of Master	Standardisation Attempted
Counting Station Master	Data on Counting Stations and Type of Counting Station
Party Master	Data on Political Parties and Election Symbols
District Master	Data on Districts
Local Body Type Master	Data on Local Body Types
Block Master	Data on Blocks
Local Body Master	Data on Local Bodies
Wards Master	Data on Wards
Candidate Master	Data on Candidate, Party and Position in Ballot Paper
Polling Station Master	Data on Polling Stations and Number of Voters

The client level database used was MS Access 2000 on a Windows NT Workstation system. The client side front end used a Visual Basic 6.0 based application. The data entry was limited to number of votes polled and the position of the candidate. The client side application after validating the



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data, used an Internet Explorer control to transfer the number of votes polled, candidates position and the candidate ID as a query string along with the Uniform Resource Locator (URL) to the State server over the VPN. The data communication session was completed when the State server returned a Yes flag to indicate the successful receipt of the string. This design permitted the local database to update the State level Janavidhi database as and when an internet connection could be established. Cases in which of successful data transmission was not feasible, the client would retry the transmission when connection is established next. In order to ease the data transmission, the option of a per record updation along with the 'as is there' data updation was also provided.

The State level facility comprised of a back up data server and a data analysis server. The primary server was hosted in the United States to take advantage of the better communication infrastructure. MS SQL 7.0 on Windows NT 4.0 was used as the Relational Database. The client side application simultaneously transmitted data to both the databases and continued transmitting it till successful receipt of data was acknowledged. The synchronisation of the two database servers was done at regular intervals. A set of standard Active Server Pages (ASP) reports were generated from the database which were loaded into a web site for viewing using Internet Information Server (IIS) 4.0 on Windows NT 4.0. An extensive set of reports ranging from state level party wise positions with drill down reports right up to the local body constituency was available. In the case of block and district panchayats lead positions were provided.

Since data on the ballot papers in each constituency was not centrally available for confidentiality reasons, it was decided to verify the electronic



ballot papers in each constituency by sending it for final verification by the District Electoral Offices. Inadequacies in the verification was extensive and was identified on the eve of the counting at the counting centre. This was rectified using the messaging facility linking the counting stations and the State level server. The messaging system initially aimed at as a monitoring mechanism turned out to be a very powerful utility for masters data verification and correction. The details of the message master are provided in Table.4. The masters were corrected at the State level and patches were sent to the district centres and counting centres for updation.

Table 4
Details of Message Masters

Message ID	Description
1	Counting Centre Identification
2	Confirming List of Constituencies
3	Confirming List of Candidates
4	Confirming List of Constituencies where election is held
5	Confirming List of Constituencies where results have been declared already
6	Test Run Result
7	Bye Bye

3.0 Results and Discussion

The application was successfully installed and commissioned prior to counting. The day of counting was marked by a strike by a section of the telephone employees which partially upset the internet infrastructure. However, the application worked well and 99% of the data and trends were captured over the network. The details of the operation of the application are provided in Table 5. The server hosted in the US (through a private Web Service Provider) crashed which created all round confusion in data communication, because of non-availability of acknowledgement



for completion of communication sequence. This was overcome by converting the backup server into the primary data base server by uploading patches incorporating corrections in the client application to each client.

Table 5
Particulars of operation of Janavidhi 2000

No. of results transmitted	57,000
No. of trends transmitted	60,000
Total size of database consolidated	54 MB
No. of simultaneous user connections and the State Server ⁸	140
Peak number of user connections at the State Server	180

4.0 Conclusion

The project was given to IKM by the State Election Commission with just 23 days to operationalise a mechanism for computerised data collection and publication across the state. Such a mammoth task of information technology application has never been taken up and executed by any institution in the State. The programme operated under severe constraints and problems inherent in executing such a project in government which included among others lack of buy in of the 'high tech' initiative, non availability of 'confidential data' and storage of resources. The Janavidhi 2000 designed to face tough weather, bore the worst brunt and lived up to its expectation.

⁸ The State Server on an occasion had also to handle 540 messages of 500 bytes length on average within a short period of 15 minutes during which CPU utilisation averaged at 25% and peak around 60%.



5.0 References

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