LOLA Rates System (1972)

Introduction

Alan Cooper was a founder LOLA employee working as a Database Administrator in the Application Support Team, The team was responsible for the technical aspects of the database including physical schema design, integrity and performance.

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Rates were a property tax based on an Assessed property value. Councils then calculated the tax rate (rate in the pound) necessary to raise the total budgetary requirement. Properties were re-Assessed approximately every 10 years.

Rate demands (bills) were issued annually with biannual payments usually by cheque or cash. During 1970s many local authorities started supporting monthly payment by the new method of bank Standing Order.

The Rates application development team was led by Jim Cleall-Harding with Dave Hearn as his senior analyst managing the analysts and Ray Smith managing the programmers. Applications were written in IBM's high-level Programming Language 1 (PL/1).

The system maintained Rates records for each property and Schedules records for landlords owning a number of properties. These were in separate databases linked to 2 other index databases: Names and Properties. These 2 core index databases would later be used by other applications. Each of the 4 borough had their own set of these 4 database.

Each on-line transactions accessed the databases via the logical schema and these schemas were replicated for each borough to match the borough's own databases. It was an agreed principle that the application functionality was identical for all 4 boroughs.

The system was designed with 9 separate rates transactions each linked to an application program [1] definition file and logical database schema, together with user profiles, together provided granular security to restrict access and updating to bona-fide users and programs.

The Rates System development commenced in 1970 and was implemented successfully to meet the 1 April 1972 statutory deadline.

The system comprised:-

1. **On-line suite of 9 transactions**: these allowed the user to view a Rates or Schedule record, set up and amend Ratepayers or Landlords, change a property's Ratepayer (and make the associated financial calculations and raise payment demands or issue refunds), amend a property's Assessment value, amend a Schedule, transfer credits and debits between accounts, access work queues (e.g. arrears recoveries), display common data (e.g. arrears tolerances).

2. **Overnight**: cash receipts which are posted in batch overnight from paper tape input, which is produced automatically from the cash receipting machine.

3. **Weekly**: analysis and weekly reconciliation provide an extensive analysis by various classes of property, increases and decreases in Rateable Value, proposals, accounting controls etc. Printing of overdue letters etc.

4. **Monthly?**: receiving bank Standing Order payments.

5. **Mid-Year & Annual**: Production of the Rate demands to be posted to all Ratepayers and Landlords. Across all 4 boroughs there were 310,000 properties and almost 900,000 population.

Technical Challenges

Memory Challenge

The application programs were large at up to 300k bytes and they were required to be written is segments that could be loaded dynamically depending on the program logic. This was to facilitate the total number of transaction (9 x 4 boroughs + test borough = 48) plus long-term needs, being within the total number supported by IMS. This of course added to the number of disk input/outputs and general overheads [2].

Data Conversion Challenge

Each Borough required their existing Rates data on the LEO sequential tapes to be converted into the 4 physical databases with all the corresponding cross reference links. Special programs had to be written for this and when initially run they exposed multiple data problems, both in the raw data and in corruption due to errors in the IMS software, Eventually after numerous attempts, each taking many hours for each borough, the data was converted.

Transaction Recovery Challenge

A further challenge was that LOLA's transactions were multi-screen conversations, i.e. multiple steps with user inputs at each step. IMS, however, would commit and checkpoint the database updates at each step in the conversation; so a system error would only roll-back to the last step – the physical database integrity was assured (so long as there were no bugs in the IMS software) but integrity was lost at the business level. LOLA therefore had to develop techniques to suspend updates until the final commitment by the user in the last step [3].

Testing Challenge

Another challenge was the slow process of testing the applications by sitting in front of a display and manually working through testing scripts. Later, the Applications Support team produced a batch testing system so that the on-line transactions could be simulated with scripted inputs and outputs comparing the outputs to the expected results.
Once the applications were tested, they needed user review and that in turn required user training and test databases. LOLA used Systems Advisory Officers to implement and review applications, plus a team concerned solely with Education and Training. Training was quickly followed by users trying the test system in their own offices [4].

Miners' Strikes Challenge

Overcoming both the technical and data quality issue required extensive staff effort in the evenings, at weekends and over the Easter holiday. Additionally, due to the miners strikes, there were electricity supply problems in early 1972. Even the Director was doing his bit checking the various outputs.

Operational Benefits

As envisaged by the Yellow Report, the system brought revolutionary change to the Rates department. Clerks moved from completing data submission forms, followed by staff keying these onto paper tape and then submitting for overnight or weekly batch processing, and receiving back reams of paper that needed laborious checking. Now the system was near paperless and instantly accessible using screens.

- For example [6] a change of property ownership using the batch LEO system required 3 separate weekly runs. Now it could be achieved in minutes with a series of linked transactions actioned in a single sitting at the terminal. Any refunds were automatically calculated and posted to the accounts system for payment by cheque.

Further the same information was available to the Housing department. This avoided wasteful telephone calls and erroneous processing due to out-of-sync data.

The new system also kept track of work in-hand, particularly valuable for complex events that are actioned over a long period, such as the legal process in recovering unpaid rates.

Further improvements involved the system managing the rates due on empty properties. This change introduced in 1968 was not fully handled by the LEO system.

At a management level, information was now available on work loads and the work of the clerical staff was more evenly spread throughout the week.

Summary

Despite all the technical challenges, the system went live, as planned, for Haringey in April that year, the start of the government's fiscal year. Hackney and Tower Hamlets followed in October of that year and Hillingdon the following March.

All together, the four main databases contained over 1 million database segments comprising some 50 million bytes of data [5].

References:
1. London Boroughs On-line rating system, S Woods, Vol 77 No 7, 1973-July
2. Experiences in Using IMS 2, A.J.O'Brien, PATRAC Conference, 1973-03-22.
3. IMS-2 at LOLA, K.W.S. LEWIS, NCC Conference, Bristol, November 1973
4. As reference 2.
5. As reference 2.
6. As reference 1.
   Links to the above can be found on the Applications page under the Rates System.

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