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HR EXPLORER

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Summary

At the European Laboratory for Particle Physics Research (CERN), Geneva Switzerland we are using OracleHR for managing our human resources since 1995. After the first year of production it became clear that there was a strong need for an easy-to-use Decision Support Tool exploring the data in OracleHR. This paper illustrates an approach which we have adopted to provide on-line management reporting, multi-dimensional analysis, drill-down and slicing & dicing of data, warehoused from OracleHR. The tool offers strong resource management and planning capabilities including career follow-up. The user management and security monitoring are implemented using the Oracle WebServer.

The Big Bang

CERN, The European Center for Particle Physics in Geneva, provides physicists with the worlds most advanced facilities to enable them to explore the fundamental constituents of matter - particles believed to exists for only nanoseconds after the beginning of the universe "The Big Bang". More recently, CERN's administrative data processing department underwent its own "Big Bang". This occurred in 1992 when in one giant leap we replaced our large old mainframes and their cumbersome proprietary software with an open systems architecture running Oracle as our chosen RDBMS [Martens 1993].

The AIS Universe after the "Big Bang"
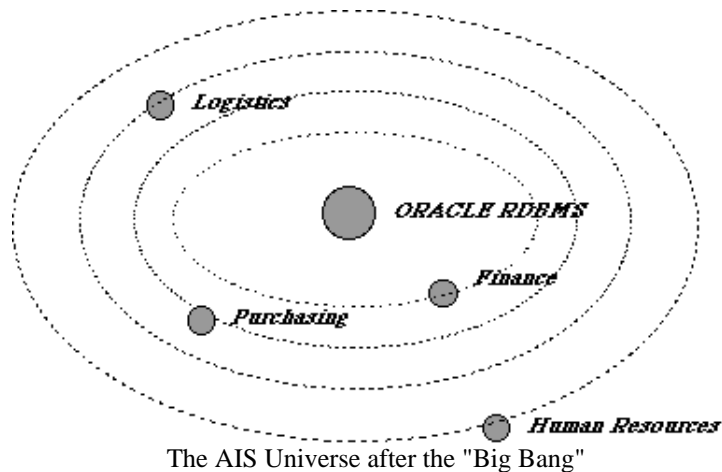
As we migrated application by application attempting to maintain an 80/20 ratio of proprietary software to in-house development, we developed our own satellite interfaces to these applications in order to provide our users with precisely the working environment which they required. For instance we developed EDH [De Jonghe 1993] the Electronic Document Handling application to manage the workflow for documents such as electronic purchase requisitions, and we developed BHT [Moller, Purvis 1994] to provide a graphical user interface for financial management.

Introducing Oracle Human Resources

In 1995, following a detailed analysis and call for tender the Oracle HR package was selected as CERN's personnel system replacement. Prior to Oracle HR several parallel systems had evolved to keep track of the 3000+ staff members, the 6000+ visitors, industrial support, temporary labour, fellows and students as well as spouses, dependent children and retired personnel. Information about people "known" to the organisation was frequently duplicated (often erroneously) and re-entered in up to nine different databases. If the CERN management required an up-to-date report on the CERN personnel situation, it could take up to several days to compile, by which time the information was out-of-date. In order to avoid this uncontrollable decentralisation and duplication of information it was clear that a centralised "do-it-all" system was necessary . However, in order for such a system to succeed it had to fulfil at least the following requirements:

- Be fully integrated with the core AIS (Oracle based) applications (finance, purchasing, payroll...).
- Allow decentralised access to centralised data sources.
- Provide a unique reference for identification of persons and eliminate the need for multiple data entry.
- Allow easy ad-hoc querying of current and historical personnel information.
- Permit support for manpower planning.

The detailed requirements [AIS 1992] are available in a 200 page report. The report accurately notes the key for success in :

> "A user friendly, largely available system from which end users can easily extract information will encourage them to enter and maintain data regularly, making this data available for client services."

Oracle HR was the application selected whose functionality most suited our specified requirements.

Limitations of HR

While the HR system fulfilled the requirements in terms of personnel data processing, it had a distinct lack of power in providing information in several domains and in particularly for operational data support and human resource planning. For example - as far as operational data goes - try and ask your HR system to display to you "all the information relating to person X". In order to include information such as their telephone number, current status, job title and career history you may have to switch between up to ten different screens in the HR system. Short of providing each user with a 21" display and the possibility to open numerous windows on the system, there is no way of having a summary of all the data relating to one person on one screen. The problem is similar for management reporting and resource planning: Can your system provide you with a list (or preferably graph) showing your personnel resources over the next five years... and their foreseen absences?

The highway to a better system

Thus our development task was defined : provide the "missing functionality" of HR. In one sense this is like providing the pedals for a bicycle : all of the key components exist already, but something "extra" is

required to make the system function at its best. Recalling one of the key criteria for success of the Human Resources project, it was essential that the data in the central HR system was easily visible and easily accessible in order to motivate the users to maintain it. Being the main weakness of HR, this was our initial starting objective with the "HR explorer" project.

However, as we started our investigations we realised that rather than being a straightforward task, what we were about to embark upon was more like trying to provide the "missing flavour" to a recipe.. there are no limits to the ingredients you can add. Given that the pre-Oracle HR systems were individually customised and developed in a decentralised fashion, how could we ensure that we could put together a system to meet all the user's different tastes? In order to assist us in these matters we turned to the World Wide Web.

A Web-flavoured development environment

The WWW was originally developed at CERN to provide efficient information access to the members of the international high energy physics community. Although the applications of the web have soared, you can still find physicists at CERN who use the web in the way for which it was originally designed. Talking to these people you will find that they use W3 to literally bounce ideas off each other. This gave us the idea of using the web with a framework for the software lifecycle of the project.

We started our web development cycle with a simple description of the project goals and our approach (a standard lifecycle model with iterations for rapid prototyping). During the requirements phase, we used the web to detail the results of user interviews. The results were quite surprising :

Building Efficient requirement interviews

We found that because all previous interviews were available on the web, then each new user only discussed requirements which had not already been discussed by other users. The only exception to this rule was if either the user wanted to extend or modify a requirement, or if the user came to the interview totally unprepared (i.e. they had not looked at the other user interviews on the web).

For the subsequent phases of the project, all information, feedback, comments, discussion and eventual specification was produced on the web... in fact it is the only software project we know which was run entirely without any user committee, or other large meeting.

The web not only helped during the initial phases of the project, but when it came to the prototyping we could use the web to show sample screens, menus, dialogue boxes and reports to the user community. As for the implementation the web was used to literally bounce ideas and prototypes between Moscow and Geneva (where part of the development took place). In short, the 350 web pages made it possible to

show and promote the "look and feel" of the system before it was even built.

What is HRT?

During the interviews it became clear that what we needed to provide the users was a set of "tools" with which they could extract, explore, consolidate, report and manipulate data coming from the HR system. Thus we named this "toolkit" the Human Resources Toolkit.

The Version 1 client of HRT was written in Visual Basic for Applications (VBA) running under Excel and using Second Wind (from Anju Technologies) and SQL*Net for database connectivity. We adopted the data warehousing approach already tried and tested with our budget management software, BHT, which involves nightly extraction and consolidation of data from our financial and purchasing databases into an Oracle data warehouse optimised for OLAP. Version 1 of HRT required approximately 15 man months of development effort. In the true international spirit of CERN, HRT was developed in collaboration with a team of Russians from the Joint Institute for Nuclear Research (JINR), in Dubna (north of Moscow).

The best way of illustrating HRT is to show a sample of the functionality provided. This will be done with the next three sections which show how HRT handles detailed, consolidated and temporal data.

HRT - Dealing with the Present

One of the key weaknesses of the Oracle HR system was the inability to see all the current information concerning a person in one window. This was solved by the implementation of the "Person Browser" illustrated below.


The HRT person browser

This screen provides for a complete overview detailing general information (telephone, email, office

etc), organisational and contractual information as well as a leave and overtime summary and the private address (access permitting). The implementation of the security rules ensures that certain zones are visible/invisible to certain people (e.g. only people in your management hierarchy may see your contract details).

As this screen represents a summary, then it goes without saying that one may also use HRT to see the details behind the figures. For example, if you wanted to see the Leave taken HRT can produce a graphical summary as illustrated below.
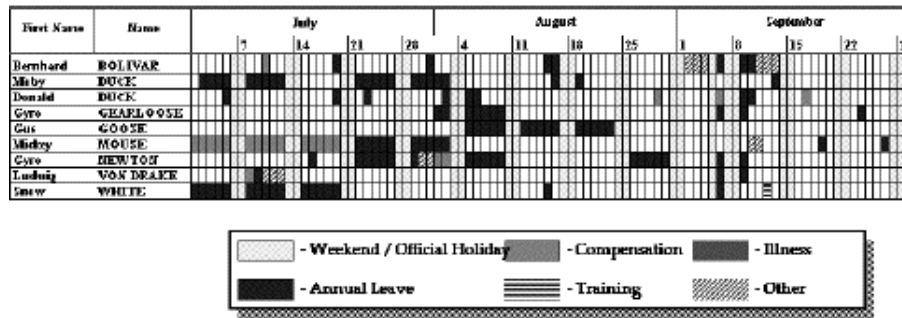
The HRT Leave Summary

From this summary you may double-click on any cell to "drill-down" to the individual leave details (showing dates, reasons and purpose) for any one individual. Similarly you may look at the overtime history of a person (shown below).
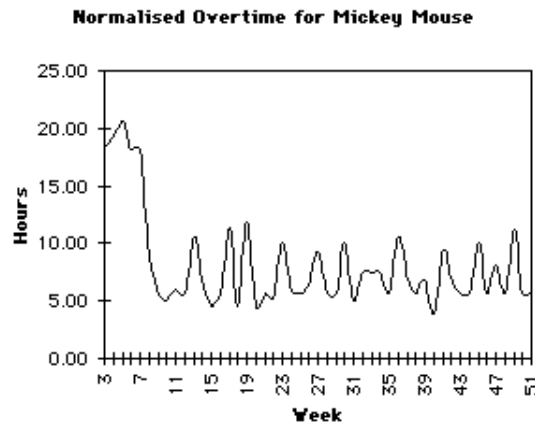

The HRT overtime summary

HRT - Dealing with the Past

The person browser functions like a camera : it provides a "picture" of the current situation, i.e. the current position, group, project and role of a person. However - what if we wish to see the history? The Oracle HR system has the facility for allowing you to see past "pictures" by setting the date for which you perform the interrogation. For example, if you want to know what position Mickey Mouse held on

the 1st of January 1993 then you would set the interrogation date in OracleHR to be 1/1/1993. However, Oracle HR provides no means for seeing an overview of the complete history for Mickey Mouse. HRT provides this in the form of the Career History browser.
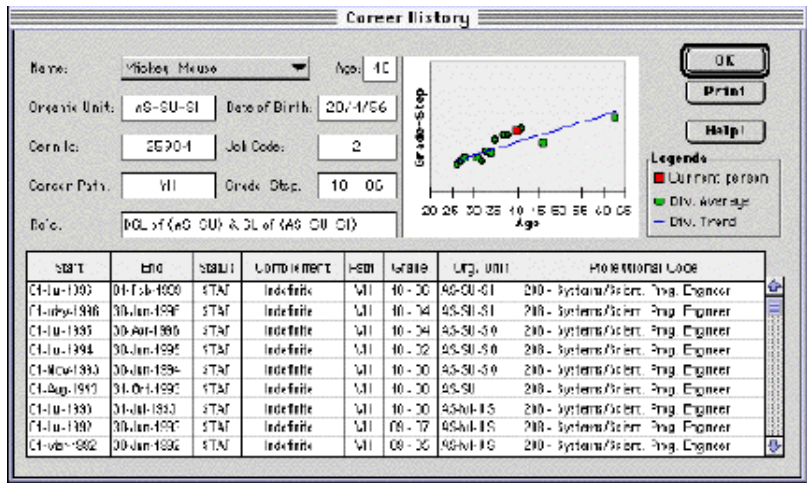
The HRT career history browser

HRT in fact provides many functions for visualising career histories and comparing them with averages of people in the same professional category. The HR system was loaded with historical data from 1986, but the HRT data warehouse has been augmented to include on-line historical data going back to 1952 (the start of CERN). Also in the line of historical data is the possibility for extracting reports of departures and arrivals for any particular year.

The security rules are slightly more complex for historical data. Currently they work on the basis that if you can see the current details then you can see the historical details. However it should also be possible to see a "slice" of the historical data for a person, for example, if person X worked in your group between 1992 and 1993 then access to his/her details for this period should not disappear when they change groups. The HRT security mechanism can cater for both situations (i.e. full visibility for the current manager and partial visibility for the previous manager) as described above.

HRT - Dealing with the Future

Now that we have a consolidation of detailed historical data in our HRT data warehouse, we can deal with the second weakness of Oracle HR - manpower planning. From Oracle HR you can produce various lists of possible departures and arrivals, but you can't really use these lists to examine different scenarios. This is where the HRT "staffing forecast" tool provides the missing functionality.

Imagine that you have just been appointed manager of a division of 120 people. You are aware that some of the groups in your division have a high average age and hence may lose manpower due to retirement... these effects may be worsened if the people choose early retirement. Additionally you know that many of the younger staff are only on short-term contracts and you may have a resource problem if these contract types are not extended or changed. How do you analyse the situation?

The diagram below illustrates some of the tools available to you in HRT:
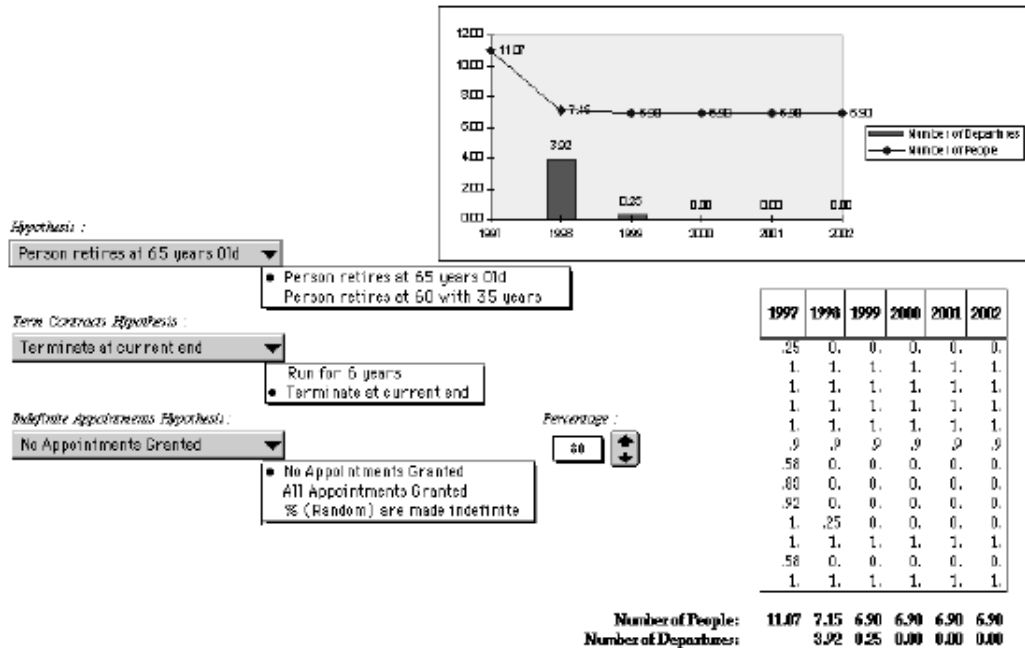
The HRT staffing forecast tools

The graph dynamically shows both the number of staff (or workforce if you have staff working less than 100%) and the number of departures for the next five years. The departures are defined by adjusting the hypothesis accordingly for early retirements, contract renewal and indefinite appointment allocation.

The above functionality is also available across projects and activities which are orthogonal to the normal organisational hierarchy, thus allowing a certain level of manpower project planning.

Graphing the HR data

Finally, to really provide the functionality which was going to easily sell the product to our user community, we incorporated a large selection of standard graphs based upon graphs which were already being produced by hand throughout the organisation. The adjacent menu shows the list of standard graphs available.
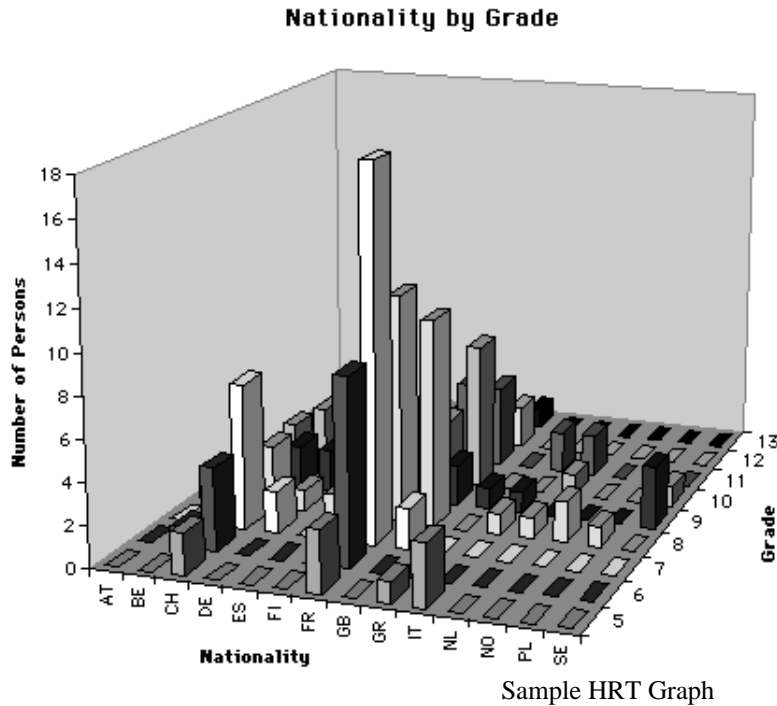
Sample HRT Graph

A sample HRT graph is shown above. As these graphs are Excel based then it is very easy for the user to customise to suit their needs. HRT also provides for custom filters to allow the user to slice and dice the data (e.g. if they only wanted to produce the above graph of nationality by grade for those people working in computing...)

Evaluation

At the time of writing this paper, HRT has been in production for one month. We have 200 registered users in the organisation, and additional requests for access are arriving daily. The feedback from the users has been better than anything we could have expected. Comments have included :

"HRT is fast, friendly and easy to use"

"HRT is a powerful tool for divisional personnel management"

"Reports which previously took days to prepare are now produced in a matter of seconds"

"This tool really saves time on the reporting tasks allowing us to focus on the more important issues"

We have received no negative criticism, and in fact any problems with the data shown in HRT has been auto-correcting as the divisional users have access to OracleHR to enable them to correct the data themselves.

Future Directions

When we started the HRT project in June 1996 the Oracle WebServer software was the hot development tool. From a software engineering point of view the HRT project would have been interesting to develop as a web based application, and in fact the security and system administration screens have been implemented using Oracle WebServer. However, it is currently not possible to implement such a powerful tool (over 120 reports, slicing and dicing of data, drill-down and multidimensional analysis) in a web framework... but we hope that with the proliferation of Java development and the availability of JDBC this will change and perhaps the future of HRT will be a Java web based application providing the same functionality as its current VBA/Excel based counterpart.

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  URL:

  The HRT Home Page http://assuwww.cern.ch/hrt/