The Impact of the Y2K Event on the Popularity of the Pick Database Environment

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Abstract. At Pick's heyday there were over 3,000 business applications available across a very wide range of hardware platforms supporting from one to thousands of real time users. The tentative economic recovery of the 90s and the Y2K fears created cautious and conservative corporate decision-making. During those tumultuous years there were startling leaps in information and communications technology rewarding those who invested in the future and in themselves. The Pick community at the time were fragmented and somewhat narrow-minded in their view of the future and were unable to collectively invest in developing new technologies. Intense marketing by 'mainstream' relational database vendors combined with ERP software vendors brought executive peer group pressure to adopt 'vanilla' relational technologies and the desire for homogeneity and perceived immunity from the impending Y2K event. A new corporate jargon was developed to further seduce executive corporate decision makers.

Keywords: Pick; Universe; Unidata; Prime; Revelation; jBase; Reality; Multivalue; Correlative; D3; SAP; Oracle.

1. Introduction

Decision making in ICT is rarely on the basis of cold hard logic or actual facts, but more often based on prejudice, comfort and expediency. Lots of decisions are sometimes made in the absence of, or despite important information.

This paper seeks to highlight an interesting historical period in the development of Information and Communications Technology in Australia and to notice the various influences of (then) emerging factors on the Information Systems that were in use at that time, and the Pick Operating Systems and Database environment as an interesting example. The period under investigation is the last twenty years of the twentieth century 1980-2000, with the emphasis on the early 1990s and the period approaching the Y2K event.

A simple Google search for the PICK operating system or database will reveal a plethora of information about the history of the Pick Operating System and DBMS over the years. It is not the intention of this paper to repeat what is already freely available. Suffice it to say that PICK was 'invented' in the USA by Richard (Dick) Pick and Don Nelson as contractors for TRW on the Cheyenne Helicopter parts and maintenance project.

This paper will look at the state of Information Systems that were in broad use during that period, the impact of the oncoming Y2K event, and the emergence of

American and German software juggernauts Oracle and SAP and why they appeared to win the hearts, minds and wallets of enterprises across the globe.

1.1 Research Approach

This is a hermeneutical analysis of a brief period in Australian IT history using first-hand knowledge of the Pick environment and being an actor in that period as the driver. Hermeneutics is a philosophy of enquiry that seeks to gain understanding about an issue or question using techniques that attempt to deal with a researcher's biases and prejudices, and in particular the effects of historicality[1] - not taking into consideration the historical milieu and social events and thinking of the time, and the way that language and its use and interpretations can colour understanding and interpretation [1].

In this usage of hermeneutics I use original documents in the form of books, reports, magazines, articles, quotations from the industry leaders of the time, reflections from practitioners and personal experience [2]. The reason for the use of the hermeneutic philosophy is to glean understanding of the historical milieu from a variety of data sources.

This research will review the 'forgotten factors' of the time, the drivers that pushed the Australian IT industry, the key decision makers and what was happening to technology then. Historical investigations such as this should be free from the emotion and biases because, as Gadamer stated, the passage of time has allowed the events to be 'closed' [3].

The understanding and appreciation of history in its unsanitised form can be helpful in avoiding mistakes and errors already committed. It is a fact that with "*all histories they are the tales of the winners who always rewrite history to their image, leaving many stories untold*" [4].

2. A Quick Summary of the 'PICK' Concept

Unless one was versed in the idea of 'Pick', there was general confusion about what 'Pick' was. This is quite understandable because one's vision and potential comprehension is governed by knowledge, experience and a suitable vocabulary (set of paradigms) with which to understand and articulate that understanding.

Operating systems in the 1970s and 1980s were mostly proprietary and non-portable between hardware platforms. As an example, HP minicomputers were released with a proprietary operating system called MPE-IV (1980s) [5] that only worked on HP manufactured equipment. Similar examples existed with IBM and DEC (VMS).

Open systems were emerging and one called Unix was starting to be seen available on several different hardware platforms. This portability was exciting the ICT

[1] Historicality: A term coined by Hans Georg Gadamer to describe the effect of time and cultural distance between the investigator and that being investigated. An example might be the difficulty in understanding life in ancient Rome from the perspective of a 21st century New Yorker.

community at the time because being tied to a particular hardware vendor was seen as undesirable for many reasons, one of which was being locked into a scalability ceiling[2]. IBM was famous at that time by offering relatively continuous scalability solutions right through to their mainframe systems.

It was quite normal for hardware vendors to also package their own proprietary operating system as a bundle resulting in the prevailing idea of an 'IBM' solution or 'HP' solution.

This section briefly outlines the Pick environment from four perspectives of a) the data model; b) the operating system; c) applications development environment; and d) the data retrieval model. Readers interesting in a more thorough explanation of this environment are referred to the bibliography for a range of material.

2.1 The Data Model

The actual database was modeled as a 'Hashed Indexed Sequential Access Method' (HSAM) mechanism. Each data record was indexed by a unique primary key that is used to calculate which frame (or bucket) is its home location inside a given fixed-size file. So for a given file and frame the read and write commands 'compiled' directly to an absolute disk, head and sector address.

Unlike other data models Pick's record structure is not predetermined by a Data Definition Language. Traditionally a database is created with the required number of tables, each table having its own peculiar structure. In Pick, one created files as needed, each one equivalent to a table. The database was then all the files that were related. Typically one would create an account called 'Student Records' and all the related files would be stored there.

Pick differs from other database models because it allows fields to have repeating values and for one field to be a 'controlling' field with others defined as 'dependent' fields. This allows alignment of repeating fields. It is also possible for any of these individual repeating fields to themselves store repeating 'sub-fields'.

Whereas people using the relational model must normalize their structures into strict two dimensional tables, the Pick model allows avoiding first normal form and the consequential join tables. Details of how Pick allowed data to be structured are well detailed by Lukaitis [6].

Thus one of the key differentiators of the Pick data model is that each 'master record' can also contain all the detail elements associated with transactions on that record. There are many examples that illustrate that the Pick model allows quite complex data structures to be represented that even today, using a strict relational model, would create very cumbersome join table proliferation and consequential management and expensive index maintenance collateral issues.

[2] Scalability ceiling: Reaching the performance limits of the hardware/operating systems platform and being unable to sensibly expand beyond that capability.

2.2 The Operating System Model

There was a stranglehold by the major vendors on their proprietary hardware and attached host operating systems. IBM, HP and DEC were but a few of the major players. It is now of historical interest the difficulties that IBM found themselves in with OS360 described by Brooks [7].

The Pick operating system was multi-user and time-sharing with the ability to run dozens of serial users on an Intel 486 computer with 512k RAM and an RS232 expansion card. Pick was an early implementer of code reentrancy which enabled efficient working set management to be implemented [8].

Perhaps from the Pick perspective, two important events were the release of the RISC engine as popularised by the Motorola M68x and IBM RS6x series chipsets and the implementation of SCSI hard disk technology which allowed very fast disk access. Pick was ported to the M68xx chipset and arrived in Australia as the Wicat computer. This was one of many ports of the operating system.

It is wise to remember, however, that in those days random access memory was very expensive and CPU speeds were only just starting to become acceptable (by those standards). The emergence of SCSI[3] technology released the hard disk bottleneck and allowed really quite fast disk operations on the smaller departmental-sized machine.

Pick's ability to leverage very fast disks, its ability to move large amounts of data quickly on and off the hard disk was its strong point. When combined with an elegant multi-user code re-entrant operating system model it was found possible to run quite large numbers of real time users simultaneously.

Of course, all operations back then were using green screen[4] technology with serial I/O along quite slow RS232 communications links.

2.3 Applications Development Environment

The applications development environment was implemented with a programming language that was tightly integrated to the host operating system and the database management system. The language syntax included very sophisticated string manipulation capabilities and dynamic arrays that mimicked and implemented the database's fundamental record structure, and internal conversion routines that allowed quite advanced date and time manipulation.

Specialised syntax allowed rapid read/write access to any files that your security level allowed. You could read an individual record or even fields within that record. Locks could be applied on a record to prevent file integrity problems surfacing in a multi-user environment to the degree where an optimistic locking strategy could be programmed to avoid a race condition and ultimate deadlock occurring.

The language compiled to a p-code[5] that was remarkably efficient in a multi-user environment and later into native chipset executable code which increased execution

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3 SCSI. Small Computer Systems Interface. A quite revolutionary interface design that allowed hard disks to perform at speeds normally associated with larger mainframe style channel architecture disks.

4 Green Screen. Character oriented screens typically 80 characters by 24 rows. No graphical user interfaces or mice as pointing devices.

speed markedly. It supported run-time relocation of subroutine code. This was keenly exploited by programmers storing the names of candidate subroutines in files that were read during program execution and loaded and run according to state conditions. Recursion was also supported, although not greatly used as it (still) is a dangerous tool in the hands of any novice programmer.

Most Pick developers were conscious of the power in the programming environment and took appropriate precautions. Nevertheless, as Dick Pick was once quoted as saying that his system was replete with features he called 'rope'. There was plenty there with which to hang yourself [9].

The only problem with this development environment and language was its name – Pick/BASIC. Most developers in the Pick community thought nothing of its name, but were constantly embroiled in bickering about the language with non-Pick developers who imagined it to be a form of Dartmouth Basic.

This unfortunate name was also responsible to large degree for its lack of acceptance, even derision by a 'sophisticated' academia who felt that anything called Basic was just that – Basic and too simplistic to even be considered. When this was compounded with a data base model that allowed non first normal form, a heresy at the time, the whole environment was simply discarded as irrelevant.

2.4 Pre SQL Environment

The query language, called ACCESS, used against a given file would be driven by the data dictionary associated with that file. In other words, using the student record example earlier, you could readily query the student file for reports or information from the target file name (student) and the list of fields (dictionary definitions) in which you were interested. This is consistent with most modern query languages such as SQL. Unlike modern day SQL, Pick ACCESS is strictly a reporting language.

3. The 1980s and 1990s Context

3.1 Database Choices

In those early days of databases there were several choices of database model. Indexed Sequential Access Model (ISAM) databases were the most popular amongst the larger machines and were used by IBM in their offerings and made 'famous' by the leading database writers of the time like James Martin [10]. The other popular database model at the time was the network model, a precursor to the relational model of today. This was popular amongst mini-computer vendors typified by Hewlett Packard and the IMAGE databases [11].

The iconic Ted Codd published a number of papers describing the two-dimensional relational database model, based on predicate logic and a relational algebra and

[5] P-Code. Pseudo code. A code that was not unlike assembler, but was interpreted at runtime by the internal Pick OS engine, not a p-code compiler.

calculus [12-14]. Numerous implementations of this relational database were spawned with some examples being DB2, Informix, Ingres, Sybase, Unify, Progress, Oracle (various hardware platforms) and later, some Open Source Unix implementations such as PostreSQL and MySQL[6].

3.2 Computer Science Departments' Impact

Universities around the world became enamoured of a DBMS that was based on a mathematical model. This was understandable as many computer science departments and their academics were born of mathematics schools [15].

Database courses were taught in Universities at the time used the popular book by Tsichritzis (Data Models) [16] that identified three main data models – the relational, network and hierarchical models and further treated on the E-R[7], Binary, Semantic and Infological models. These were the only models taught.

Only now it becomes evident that many of these computer science career academics did not have any real industrial or commercial exposure with real world databases. This lack of experience was manifested in the sorts of data models and environments that were used to demonstrate the power of the relational model.

3.3 The Drive away from Centralised DP Departments

Mainframes were becoming increasingly unpopular because of the hold by DP[8] departments on business applications development (COBOL, PL/I, RPGII, etc.) and delays and errors in delivery of systems. Anecdotal evidence at the time estimated the applications development lead time to be about 4 years. The inability of centralized DP departments to provide satisfactory service levels (sic) led to local 'Departmental' solutions leveraging off the emergence of the new mini-computers. Many of these solutions were sourced from enterprising companies who could see the need for bureaus, a service that companies or Departments could buy to solve pressing IT problems.

The same themes are emerging today with offshore development now quite popular, and the emergence of cloud computing that promises applications, infrastructure and even complex information systems solutions at the click of a mouse.

3.4 Accountants and Managers Freed from their DP Departments

Spreadsheets[9] empowered the accounting fraternity with the ability to create complex budgets and perform 'what if' scenarios. This released accountants from the control of

6 MySQL: Bought out by Sun Microsystems which is now owned by Oracle.
7 E-R: Entity Relationship data model.
8 DP: Data Processing departments as they were known at that time.
9 And later and more ubiquitous was LOTUS-123.

their DP groups and mainframe-based computer financial models and gave them the independence to plan, model and forecast without the constant DP engagement.

This independence from DP departments had a liberating effect on the executives of organisations. What became clear to them was that their DP people were not as critical as once thought; and that the corporate world did not collapse once these PCs were were deployed.

3.5 The Internet

The second thing after PCs and spreadsheets was international data communications, Usenet and email. In hindsight this event created the birth of the global village. By subscribing to your local ISP of the time you could plug into the wisdom of thousands of savants and exchange electronic mail with them and others instantly. Back in the 1980s some quite serious problems could be tackled by joining the appropriate user group and taking a few tentative steps in asking for help. Like today's Wikipedia and Web2.0 the newsgroups were dominated by the loudest and most shrill voices and those with the most apparent authority. It is not surprising then that many vendors spent considerable budget ensuring that their message was being received loud and clear.

It is also important to remember that the Internet of the 20th century was not yet indexed as is today's Internet and search engines were still not even a dream. If you wanted information you needed to know where to get it. Vendors were very quick to see this Internet thing as a new marketing opportunity.

3.6 Australian SMEs

Because of simple scale factors, Australia had a lot of small to medium enterprises (SMEs) for whom mainframe solutions were inappropriate and who might have turned to a bureau solution. The new mini-computers [17, 18] became attractive options and were actively pursued. Companies whose IT was agile enough to 'move with the times' often gained significant competitive advantage by simply having better IT solutions than their competitors.

Examples of this were the burgeoning Credit Union movement in Australia, sophisticated Insurance and Library solutions, and very popular manufacturing and distribution systems reminiscent of the original TRW product and precursors to the MRP and MRP-II[10] products.

In a later section I will mention the impact of 4th generation languages. However, Australian SMEs took great advantage of the flexibility of the data model, the power of programming and reporting and the rapid applications development opportunities afforded by the these 4GL environments by developing bespoke applications that genuinely met their specific business needs.

[10] MRP: Materials and Resource Planning – precursors to modern ERP packages.

3.7 Voices from the Australian Pick Community in 1992

The Australian Pick community was quite vibrant in those days, led mainly by competing vendors of specific Pick flavours. A snapshot of the conversations of the day identified surprisingly few controversies.

Peter Fenwick suggested that "*Pick's future is rosy because of its acceptance of Unix (Open Systems) as a host operating system. Pick is far more efficient than its competitors so one can run more users on equivalent hardware*" [19]. He was one of many who were moving away from Dick Pick's view that a hand written operating system was more powerful than Open Source (aka Unix in its various flavours). Rob Coulsen, a major reseller of the time agreed and added that "*Pick's success will be driven by its breadth of applications*" [20].

Others like Terry Leister from vMark [21], Al Dei Maggi of Sequent [22] and Charles Cave from Unidata [23] also saw that a GUI (Graphical User Interface) was key to Pick's ongoing success. Tom Couvret of Prime [24]. And Bob Highland of GA [25] felt that the new data communications technologies needed to be addressed.

Many like Tim Chianti from Apscore [26], Mike Ferris from Unipix [27] and John Buchanan of Triad [28] all thought that Pick needed to embrace interoperability with SQL, the 'mainstream' relational database vendors as well as integration with the emerging Microsoft Office suite.

An interesting comment of that time was from Barry Churchill of the NRMA who stated "*Pick must employ the principles of TQM in continually addressing seamless integration with today's (1992) technology. Pick needs to listen to its users to understand what their needs are. After all, it's the 'users' who will buy the business systems*" [29]. But a more light-hearted comment was made by Alan Glassman from BIX who suggested "*Pick needed to be ported to the 'state-of-the-art' 3270/RJE and HASP protocols. Microsoft to re-introduce command line for Windows/LANMan and Client/Server systems. ADDS terminal division releases a toast-r-oven connection to their 9000 series terminal*" [30].

The recurring themes from the Pick community were that Pick as an operating system was doomed and that Unix was to be the host of the future. Interoperability with the burgeoning PC marketplace and other systems (RDBMS[11]) was the next theme followed by the emerging industry standards such as SQL. Networking was addressed by some and its relative low profile in these discussions indicated how little the Pick community thought about TCP/IP, LANs and distributed databases.

3.8 Pick's Popularity

During the 1980s through to Y2K Pick boasted that it had more business solutions available than any other environment. There was even a publication called 'The Business Software Catalog' that detailed over 3,000 such business applications [31]. The vast library of systems written in Pick/BASIC could be ported from single user machines through to high-end symmetric multi-processors with redundant non-stop architecture capabilities supporting thousands of real-time users.

[11] RDBMS: Relational Database Management System.

In addition there were several integrated development environments based on Pick called fourth generation languages (4GL) or CASE[12] tools that ranged from elementary program generators such as Wizard[13] to truly configuration and data driven enterprise-class engines such as Cuebic[14], SB+[15] and Posh[16].

In the 1990s it was not uncommon for an organization to identify a software solution that it needed and to purchase (separately) the hardware platform upon which to mount an operating system (such as Unix), a version of Pick (such as Universe), a 4GL (such as Posh) and the accounting, finance and HR system written in Posh. The average CFO could not understand why it was not possible to get everything from one shop on the one invoice, like with an IBM solution.

There was great end-user flexibility in the choices available and numerous vendors each able to supply the 'perfect solution'. The competition was consequently brisk and in high value cases, immensely pressured. The various 'Pick' vendors robustly vied with each other for the prize of the Operating System licence that was often tied to a hardware platform because of the limited ports made by that vendor.

The other edge of the sword was that when errors or difficulties arose it was often difficult to identify the culprit – hardware, operating system, DBMS, 4GL or applications software and it was not uncommon for each to blame the other.

3.9 Just Before Y2k

As the Y2K event approached, the 'mainstream' RDBMS community was mounting a major marketing campaign along with emerging larger software houses like SAP guaranteeing Y2K compliance and promising many years of trouble-free use with their 'best of breed' and 'world's best practice' products. This idea appealed to many 'C' level executives and a lot of organisations who were struggling with their legacy COBOL, RPGII and PL/1-based systems, elected to adopt typically SAP or Oracle solutions.

There was comfort in conforming to peer group pressure that was vigorously supported by so many seemingly knowledgeable people in so many forums. After all, if everyone was going that way then surely everyone can't be wrong?

The emergence of a new marketing jargon embracing such concepts as best of breed and world's best practice started to bite. It was commonplace then to hear these terms used by vendors who claimed them for themselves. Their international marketing penetration brought the use of these terms into the current corporate language, but most importantly, associated with their particular products.

Furthermore, these vendors bypassed the normal ICT decision-making processes by presenting their sales pitches to the senior executives like CEOs and CFOs bypassing the impotent IT and DP managers. Company directors were targeted

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12 CASE: Computer Aided Software Engineering.

13 Wizard: An early program generator that 'created' PICK/Basic code from user entered parameters to describe transaction processes against Pick databases.

14 Cuebic: A name alluding to the three dimensional nature of the Pick data model.

15 SB+: System Builder plus.

16 Posh: An acronym for 'Port Out Starboard Home', the preferred window allocation on trans-Atlantic boat trips. The name was adopted by its designer and developer Warren Dickins, a boating enthusiast.

directly through their associations, a practice just unknown amongst the Pick community.

3.10 What changed?

At the Y2K event on Saturday January 1st 2000 the world did not end, electricity kept coming out of power points, water flowed as did gas. The IT community rejoiced in their collective wisdom and ability to prevent the disasters that were predicted. However, a number of important new influences or orthodoxies had emerged and had taken root…

- Alignment between cost and value and quality:
  - The acceptance of products such as Oracle and SAP and their million dollar price tags by financial controllers seeking Y2K immunity.
  - How can something costing $150k possibly be as good as something costing $1.5m?
- Microsoft establishes universal acceptability of faulty software:
  - The now infamous EULA states unequivocally that the software you have bought is not guaranteed to work…
- A new corporate jargon emerges:
  - Multi-million dollar applications from Europe and the USA with labels such ‘best of breed’, ‘world’s best practice’ and ‘enterprise class’.
  - Would you be brave enough to argue against a product solution that was ‘acknowledged the best of breed’ for your industry sector?
- Decision making on IT acquisitions went from the IT people to the accountants:
  - Accountants who have now been liberated from their IT departments are now calling the shots on high value IT decisions.
  - There is a growing atmosphere of suspicion about the justifiability of the huge Y2K expenditures [32].
- The Windows GUI is the only practical user interface to a computer.
- The Internet (and TCP/IP) is now the accepted data communications orthodoxy.
- Safety in numbers:
  - In the older days, nobody was ever sacked for buying IBM.
  - Corporate leaders meet and compare notes about their respective IT solutions.
- Universities control the corporate thinking:
  - Thousands of graduates have only ever been exposed to the Codd relational model and cannot conceive of other models.
  - Students are increasingly educated using artificial business models that neatly fit their relational toolkits and avoid real-world complexity.

The Pick community was certainly not united. Even the local Victorian IPUA attempted to assuage their vendors’ sensibilities by renaming themselves to the ‘Multi-Dimensional Database Forum’ to remove the word ‘Pick’ from the association name. Few licensees embraced TCP/IP and fewer still acknowledged SQL and interoperability, and those that did make such an investment ensured that it remained proprietary and certainly not portable to other Pick vendors.

Perhaps the most important, if not subtle change was how corporate ICT decision making had evolved. The vendors, both ERP and their associated database suppliers no longer dealt with anyone lower than the absolute top level decision makers. After all, why negotiate with an IT manager when they would have to put a submission to a higher authority.

Associated with this exclusion of the IT personnel is the windfall consequence of financial decisions being made with only the highest level decision-maker. The vendors are then only beholding to the boards of directors who have already been marketed at their associations such as the Australian Institute of Company Directors.

4. Conclusions

The Pick community's inability to work together on keeping up with technology will be one of the reasons that many organisations will be electing to drop Pick as their preferred business platform and select more expensive mainstream solutions.

It is my opinion that industry had become so used to the two dimensional database model that interfaces tended to mirror the spreadsheet in concept. Pick's data model being inherently three (or even four) dimensional was difficult to effectively represent with the tools of the day and it never made an effort to effectively market the innate advantage that such structures offered. It is of passing interest that today's advanced HTML is now capable of such a representation without too much difficulty.

It is also curious to note that no popular operating system has been named after its inventor. Had PickOS been named something like OSMV (OS Multi-value) then a lot of criticism might have been avoided, and many days in the California Superior Court likewise avoided. And had Dick Pick named his programming language similarly after the famous courtesans like Pascal and Ada, perhaps something like 'Zion' might have reduced the criticisms of the language name.

But it is perception that matters today and perception is reality. Perception is a controlled substance and today the accepted orthodoxies are Windows point and click, Internet, Unix, rigorous Codd relational model and it just has to be 'world's best practice', whatever that means. With senior executives independently making the key decisions today, businesses are happy to change their business models and processes to align with some 'best' standard from Europe or America as manifested in a small selection of 'Enterprise' systems. And thanks to the largest software manufacturer in the world, it doesn't necessarily have to work entirely properly either.

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