Online Navigation – SNIP Comes Of Age

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Introduction

The SNIP (Shared Navigation Integration Project) was commenced by Fugro Multi Client Services (then Seismic Australia Pty Ltd) in 1996. The Q Sea Company is SNIP's technical manager and compiles the database. The aim of SNIP is to overcome the inadequacies of existing navigation databases by providing seismic navigation data in a uniform, quality controlled format on a single datum. The advent of new internet technology has allowed the development of SNIP into a web-based tool for finding and browsing navigation data online (figure 1). This article describes some of the technical decisions and resources behind the development.

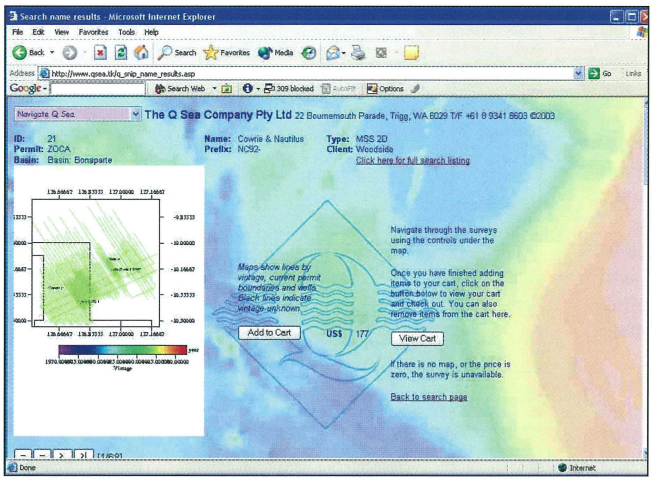

Fig. 1.

Platform Development

Early development of the project was Unix based. Seven years ago all SNIP processing was on $20,000 Unix workstations. However, it is now possible to build a Pentium IV computer for less than $1,000 with a processing speed approaching 200 times that of those workstations. It was therefore decided to port all software and services to the Windows XP platform. This could have been quite onerous, but the job was made much easier using command line processing and scripts through Cygwin, which is a Linux-like public-domain environment running under Windows.

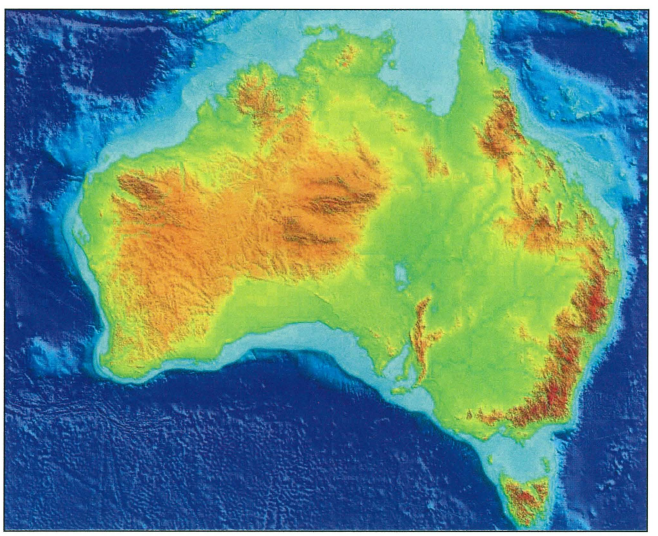

Fig. 2.

Broadband and Server Choice

Broadband services have revolutionised the Internet over the past two years. At the same time, Windows (through XP) has evolved into a stable environment suitable for running Internet servers. In particular, Microsoft's Internet Information Services (IIS) provides a highly reliable, manageable, and scalable Web application infrastructure for Windows. IIS increases Web site and application availability while lowering system administration costs. IIS directly supports ASP and MS Access database functionality, a critical aspect of putting SNIP online, as the metadata has always been based on MS Access.

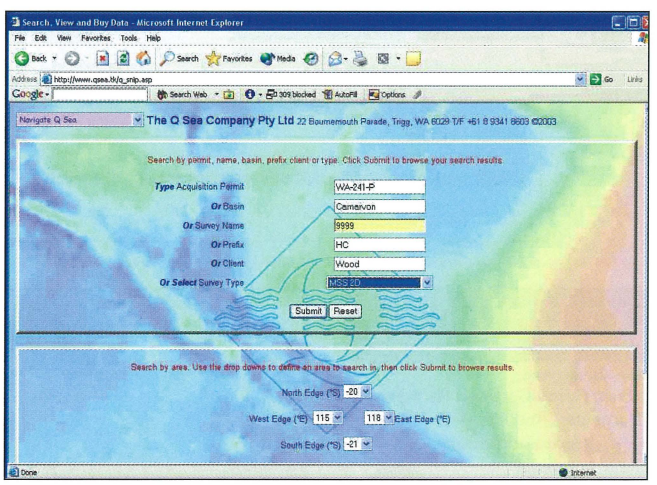

Fig. 3.

Conversion and Mapping Software

The SNIP partners realised in 1996 that the database would need to be available in both AGD84 and GDA94 (the new Australian datum). Enquiries revealed that GDA94 would be a geophysically insignificant vector from WGS84, and as the GDA94 parameters had not then been published, it was decided to develop the database on both AGD84 and WGS84. WGS84 is also the datum on which GPS is based. It was also realised that data coming in to the project would be in many different formats and potentially huge file sizes, so it was decided to develop in house conversion software which could batch process into P1/90 format, accept limitless file types, change datum and projections in a single pass, and check output for record integrity. Developed in C++, the software (QCX) has now been ported to the Windows platform.

It has always been necessary to be able to view surveys to visually quality control them. The mapping software used is Generic Mapping Tools (GMT3). GMT3 is a collection of public-domain Unix tools that allows one to manipulate x,y and x,y,z data sets (filtering, trend fitting, gridding, projecting, etc.) and produce PostScript, PDF and jpeg illustrations ranging from simple x-y plots, via contour maps, to artificially illuminated surfaces and 3D perspective views in black and white or 24bit colour. Linear, log10 and power scaling is supported, in addition to 25 common map projections (figure 2). The processing and display routines within GMT3 are completely general and will handle any x,y or x,y,z data as input. Once again, the tools have been ported to run under Cygwin, so now much of SNIP's processing is automated through a suite of QCX and GMT scripts.

Database Development

One of the most important aspects of SNIP is the completeness and uniformity of metadata. Each header is exactly the same length and contains extra information such as line km, survey and bathymetry quality indicators, data source, etc. The metadata is initially entered into the MS Access database, from which developed macros create the headers themselves. A stripped down version of the MS Access database is used in conjunction with smaller than usual stick maps for the web – it is important to keep load and search times to a minimum. Timing is also improved through compression and caching of the web files.

GIS

Very commonly, explorers will need to find out which surveys (if any) have been acquired

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in a particular geographical area. This is achieved using GMT3 to extract each survey's extents and then loading the extracted values into the database. Queries are provided both on the website and in the MS Access database issued to participants to allow geographic or named searches (figure 3). The data can also be decimated (for example, choosing every 30th shot point or a particular maximum offset) so that the resulting map file is not unmanageable.

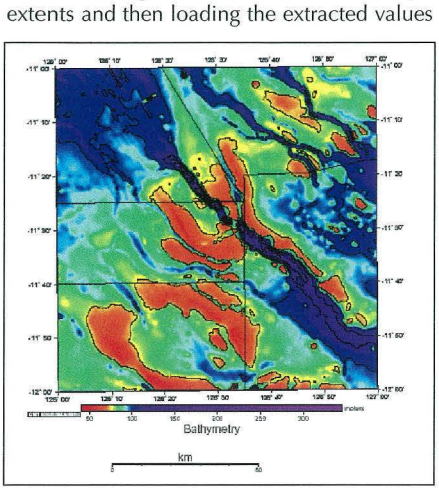

Fig. 4.

Bathymetry

The High Resolution Bathymetry Grid (HRBG) is an extension of the SNIP project. A large amount of seismic navigation data, much of which contains bathymetry on a per shot basis, has been collected over the past five years through SNIP. This data has been formatted into UKOOA P1/90 and converted to the WGS84 (GDA94) datum. The files all contain uniform, comprehensive header information. To date, the bathymetric data remains unused.

GeoScience Australia has produced the Australian bathymetry and topography grid (January 2002) which supplies bathymetry at a 0.01° (~1 km) grid size. Although an excellent product, this grid is considered to be too coarse to be of detailed use for most oil and gas exploration and production companies. A similar grid (~2 km) has been produced by NOAA. High resolution bathymetric grids of the Australian Shelf are now being produced on demand for anywhere on the Australian Shelf where there is controlled bathymetric information (figure 4).

Specially developed GMT3 scripts read arbitrarily located (x,y,z) triplets and avoid spatial aliasing. Importantly, the data is ***weighted*** and the software works on multiple files simultaneously, so that data can be biased according to reliability, vintage and accuracy. ■