Porting Oracle with the ANDF Compiler Technology — A Progress Report

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Abstract

We have received the Oracle Porting Kit, Release 6.0.36 including library support for two platforms. The platforms are an Ultrix 4.2 PMAX (MIPS) and a SCO SYSV 3.2 (iX86).

Two major and three minor functional parts of Oracle have been successfully ported with the ANDF compiler technology in a native mode. All components of these parts have been compiled, loaded and locally tested within the components directory structure. The latest code drop from DRA has been used in this effort.

We are currently engaged in analyzing the Oracle header files to discover an extended common API which will successfully abstract the shape of the source code beyond the purview of the XPG3 ANDF header file set in a machine and platform independent way. Initially, this extended API should be sufficient to use the ANDF compiler to distribute intermediate ANDF (.j) files which install and properly execute these parts of Oracle between the above two platforms. Futher investigation is planned to extend the API across a wider set of platforms once the initial goal is achieved.

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1. Introduction

This paper reports on our experience in the OSF Research Institute with using the ANDF compiler technology to build and execute several parts of Oracle.

We assume that the reader is somewhat familiar with Oracle, and so give only cursory information about it in the following section.

Essentially, we are pursing the goal of increasing the robustness of the ANDF compiler technology toward an industrial strength level of quality such that it delivers product quality for applications across a wide variety of heterogeneous platforms. Toward that end, we have, to date, successfully ported two major and three minor functional parts of Oracle using the ANDF compiler in a native mode. All components of these parts have been compiled, loaded and locally tested within the components directory structure. The latest code drop from DRA has been used in this effort. Oracle is but one of a number of industrial strength applications in our robustness project plan.

We are currently engaged in analyzing the Oracle header files to discover an extended common API which will successfully abstract the shape of the source code beyond the purview of the XPG3 ANDF header file set in a machine and platform independent way. Initially, this extended API should be sufficient to use the ANDF compiler to distribute intermediate ANDF (.j) files which install and properly execute these parts of Oracle between the above two platforms. Futher investigation is planned to extend the API across a wider set of platforms once the initial goal is achieved.

In subsequent sections we indicate briefly the current status of our porting investigation, and render preliminary conclusions.

2. Software Information

Software Category

Oracle is the well known RDBMS product.

Oracle Version and Release Level

Oracle version 6.0.36 source code was used.

Authors and source

The authors of the Oracle RDBMS product are the Oracle Corporation.

Oracle RDBMS represents just under 1.9 million lines of C source code.

ANDF Technology Version Release

Release TDF-930127 of the ANDF Technology was used which is based on the TDF Specification Issue 2.0 Revision 1 dated December 1992.

OS Platform Environments

Ultrix 4.2 DECstation 3100 (MIPS) and SCO SYSV 3.2.1 (i486) with ODT 1.0.

3. Current Status of the Oracle Porting Investigation.

The two major functional parts of Oracle which have been ported with the ANDF compiler technology in a native mode are the **Rdbms** and **Forms30.**

The three minor functional parts of Oracle were **Sqlcalc, Sqlplus** and **Report**.

Initially, we attempted to compile using the native compilers on both platforms and were not always successful. On the Ultrix platform we assume this was because we were not attempting a full-blown build of Oracle from scratch and not all parts of Oracle were being built in the usual order including some pieces which are dynamically generated on the fly by various oracle preprocessors. On the SCO SYSV 3.2 platform, this was, however, not the case. Oracle source code caused the native compiler (rcc) to exceed fixed table limits, and the bundled cc compiler was not able to preprocess successfully. It seems that

our release level of the system 3.2.1 and ODT level 1.0 are not the latest releases of iX86 platforms in use by Oracle for porting. Upgrades to release level 3.2.4 andf ODT 2.0 were recommended by Oracle and presumably cure the native compiler (rcc) problems.

Once the method for generating Makefiles was suitably modified to use the ANDF compiler and the define flags were consistent with navigating through the native platform header files on the above platforms, the ANDF compiler sailed through builds of all of the above components. All of the minor components have been successfully tested in the same manner used by Oracle Corp.

To date, we have not received a test suite used by Oracle internally for product verification of the two major components. We plan to use this test suite to subject the ANDF built components to the same rigorous testing as if it were an Oracle product.

The next phase of our plan calls for using the ANDF compiler technology in a strict ANDF header file mode, i.e. no native header files are used. Native headers which contain target dependent definitions of C constructs used in compiling Oracle are disallowed. [see “Porting to ANDF” by S. Macrakis, in ANDF Technology: Collected Papers, Volume 1, January 1993]

We are currently analyzing the Oracle header files to discern those constructs which are natively defined. For these constructs, we are planning to describe extensions to the ANDF header file set, XPG3, such that tokens by the same name of the construct can be used during the ANDF compilation process. For each install site, it is then necessary to build an extended API token definition library which maps into the native platform.

We have only just begun this phase of the effort, as so do not have any status to report other than the second phase of the effort has started.

What we are seeing are application dependent header files which hard code absolute path names of system header files. There are also application dependent versions of these hard coded header files in the directories which are searched prior to the ANDF header file set.

4. Preliminary Conclusions.

It is clear that the coding and porting practice of Oracle Corporation is very platform target dependent. We are optimistic that we can suggest ways to improve the Oracle source code to accomodate a higher degree of portability between a wider set of platforms and architectures via use of the ANDF technology.

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