

> **MIGRATING UNIX/LINUX  
OPENEDGE APPLICATIONS  
FROM A 32-BIT TO A 64-BIT  
OPERATING SYSTEM**

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## INTRODUCTION

The market is driving the move from 32-bit to 64-bit operating systems. If you're an application developer or database administrator, for an independent software vendor (ISV) or a corporation that develops its own applications—and you work with Progress® OpenEdge® applications developed with the 32-bit products on UNIX or Linux—how can you migrate those applications to the 64-bit environment listed in the table in the Environment section?

Fortunately, the process for taking an existing OpenEdge 32-bit application and migrating it to become a 64-bit application is straightforward and easy to accomplish. This document is designed to help. It covers all aspects including:

- > Compiling the ABL Application
- > External Dependencies
- > Determining if your Operating System supports 64-bit

## WHY MIGRATE?

### ***Market Driver***

A fundamental market change from a 32-bit to a 64-bit architecture is underway, and a large number of computers manufactured today are, in fact, 64-bit capable.

When 64-bit CPUs were first released, they were reserved for very large systems located in data centers because memory was very expensive at the time. In recent years, however, memory prices have dramatically dropped. Now even the smallest machines, like laptops, can have more than 4GB of memory to take advantage of 64-bit processing.

In another, related industry trend, organizations have already started to place demanding requirements on databases for improved scalability (larger volumes of data), reliability, and availability. Customers have required and will continue to require that vendors deliver 64-bit solutions to meet their ever-expanding needs, especially for dealing with very large collections of information. Vendors have responded by re-architecting their operating

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systems. These, combined with fast, powerful 64-bit CPUs, support applications that can quickly and easily access large amounts of data to maximize operational performance.

During this transition period from 32-bit to 64-bit computing, Progress Software has addressed the trend by providing 64-bit OpenEdge products in addition to its existing 32-bit products. Users can typically execute their existing 32-bit applications on the newer 64-bit operating systems without issue. However, these 32-bit applications receive none of the benefit offered by the larger 64-bit address space.

As older 32-bit machines are retired and replaced by 64-bit machines, and applications continue to evolve and grow, 32-bit processing will eventually go the way of the dinosaur and its modern day equivalent, DOS. Vendors will over time discontinue support for their 32-bit operating systems in favor of 64-bit. For example, Sun Solaris 10, released in 2006, and IBM AIX 6.1, released in 2007, both are 64-bit-only operating systems. The previous 32-bit versions of these operating systems are on a path towards retirement as published by the vendors.

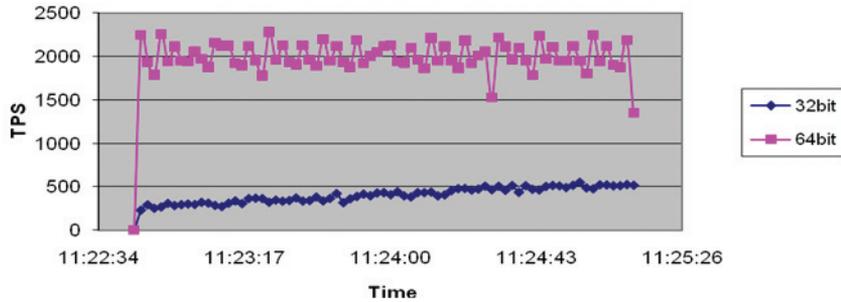
OpenEdge is following the market by helping customers migrate to a 64-bit environment, setting the stage for eventually dropping support for 32-bit operating systems that will be discontinued by their producing vendors.

### ***Performance***

The major benefit for moving to a 64-bit environment is the ability to access more shared memory, overcoming the 2 gigabyte limitation of 32-bit operating systems. The result is more data available in shared memory, providing significantly faster access to data that would otherwise be residing on disk.

OpenEdge provides both 32-bit and 64-bit environments. However, a 32-bit OpenEdge application running in a 64-bit environment does not allow the application to take advantage of the 64-bit resources. In addition, running a 64-bit OpenEdge application in a 64-bit environment is seamless; there are no specific start-up parameters to enable although you may elect to retune your application (-spin or -B) to take advantage of the resources available only to 64-bit programs.

The following I/O bound benchmark shows the 64-bit environment increases its workload by five (5) times compared to a 32-bit environment. This graph is based on OpenEdge 10.2B 32-bit compared to OpenEdge 10.2B 64-bit. The OpenEdge 64-bit environment can do 2005 transactions per second (TPS) versus 405 TPS in an OpenEdge 32-bit environment on the same machine/hardware.



#### **OpenEdge 10 32bit vs. 64bit**

4 GB working set of a 100 GD database

## ENVIRONMENT

The information in this document covers migrating from a similar 32-bit environment to a similar 64-bit environment (i.e., with same operating system). It will not cover cross-platform migration, i.e., moving from, say, IBM AIX to Linux. Please consult your Progress Account Manager if you are considering moving your application from your current operating system to a different one.

32-bit Operating System		64-bit Operating System
Sun (SPARC) Solaris	→	Sun (SPARC) Solaris
HP-UX (PA-RISC)	→	HP-UX (PA-RISC)
LINUX (x86)	→	LINUX (x86)
IBM AIX	→	IBM AIX

## OpenEdge UNIX/Linux Support

The grid below shows the supported OpenEdge 10.2B operating systems (OS). The grid identifies the OS and which CPU it supports. For example, IBM AIX 5L 5.3 is both 32-bit and 64-bit capable. However, AIX 6.1 runs only as a 64-bit OS.

Platform	Supported OS Edition (s)	OS 32-bit	OS 64-bit
IBM AIX (POWER PC)	AIX 5L 5.3 (TL-7)	X	X
	AIX 6.1		X
Linux (x86_32)	Red Hat Enterprise Linux AS/ES/WS 4.0	X	X
	Red Hat Enterprise Linux 5	X	X
	SuSE Enterprise Server 9	X	X
	SuSE Enterprise Server 10	X	X
	SuSE Enterprise Server 11	X	X
	rPATH Linux Release 1	X	X
	CentOS 5.2	X	X
HP-UX (PA-RISC)	HP-UX 11i v1 (11.11)	X	X
	HP-UX 11i v2 (11.23)		X
	HP-UX 11i v3		X
Solaris (SPARC)	Solaris 9	X	X
	Solaris 10		X

**Table 1:**

*OpenEdge 10.2B Supported UNIX and Linux Platforms*

## Operating System Check

The first step in migrating is to confirm exactly what operating system version you are currently running. Typically, you will be able to migrate from 32-bit to 64-bit without a change of hardware, but it is advisable to check the minimum operating environment suggested for the target platform and product.

## SUN

### How to check your environment:

Sun Solaris 10 is a 64-bit-only operating system. Sun Solaris 9 is both a 32-bit and 64-bit capable; therefore, you should run the following command to find out which environment you have on a SUN Solaris 9 machine:

```
Solaris 9 - run isainfo -v
        64-bit sparcv9 applications
        32-bit sparc applications
```

### How to boot in a 64-bit mode:

*Use the eeprom command to change the boot configuration:*

**64-bit:** /usr/sbin/eeprom boot-file="kernel/sparcv9/unix"

**32-bit:** /usr/sbin/eeprom boot-file="kernel/unix"

This change will take effect the next time the system is rebooted.

## IBM

### How to check your environment:

IBM AIX 6.1 is a 64-bit-only operating system. IBM AIX 5.3 is both a 32-bit and 64-bit capable; therefore, you should run the following command to find out which environment you have on an IBM AIX 5.3 machine:

```
AIX 5.3 - run getconf -a | grep KERNEL_BITMODE
```

```
KERNEL_BITMODE: 64
```

### How to boot in a 64-bit mode:

*Execute the following commands in sequence:*

```
ln -sf /usr/lib/boot/unix_64 /unix
```

```
ln -sf /usr/lib/boot/unix_64 /usr/lib/boot/unix
```

```
bosboot -ad /dev/hdiskxx
```

```
shutdown -r
```

## HP

### How to check your environment:

HP-UX 11i v2 and v3 are 64-bit operating systems. HP-UX 11i v1 is both 32-bit and 64-bit capable; therefore, you should run the following command to find out which environment you have on a HP-UX v1 machine:

```
HPUX 11i v2 - run getconf KERNEL_BITS 64
```

### How to boot in a 64-bit mode:

To run the 64-bit environment you must get the 64-bit media and reinstall the operating system.

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## Linux

### How to check your environment:

All Linux operating systems support both 32-bit and 64-bit modes. Always run the following command to determine the environment you have. Please be aware that the underlying hardware may be 32-bit as 64-bit hardware has become more prevalent only recently.

```
Linux – run uname –m –
```

If the answer is i386 or i686 then it is 32-bit

If x86\_64 then it is 64-bit.

### How to boot in a 64-bit mode:

To run the 64-bit environment you must get the 64-bit media and reinstall the operating system.

### ***Installing 64-bit OpenEdge***

OpenEdge 64-bit executables must be installed into a different directory than the OpenEdge 32-bit files. In other words, do not install the new version on top of the previous version.

The following steps assume that the 32-bit version of OpenEdge is no longer required:

1. Shut down the database.
2. Back up the database.
3. Back up the current 32-bit installation.
4. Boot the machine in 64-bit mode if necessary. (See the Operating System Check section.)
5. Install the OpenEdge 64-bit product into a different directory from the OpenEdge 32-bit product.

## MIGRATION

### ***Migrating Data***

OpenEdge 32-bit and 64-bit products have a common OpenEdge database. There are no database structure differences; only the OpenEdge executables are built differently. It is therefore not necessary to dump and load a database when migrating from 32-bit to 64-bit mode.

### ***Migrating Applications***

To moving an OpenEdge 32-bit application to 64-bit you need to:

1. Recompile r-code
2. Recompile any shared libraries that are loaded by the 4GL  
PROCEDURE proc-name EXTERNAL "dllname"

[ CDECL | PASCAL | STDCALL ]

[ ORDINAL n ]

[ PERSISTENT ] :

[ parameter-definition ] ...

END [ PROCEDURE ] statement.

These shared libraries need to be compiled to be 64-bit libraries. See the C Compiler and Linker man pages for your system. (See appendix A for additional information).

3. Convert Host Language Call (HLC) environments to 64-bit. Similar to recompiling shared libraries, all HLC applications need to be 64-bit. (See appendix A for additional information.)
4. Re-tune your application.
  - > You can now take advantage of more memory.
  - > This may cause the system to run faster, which may require you to re-tune the following:
    - > BI Cluster Size
    - > Number of APWs
    - > Data location on disk

- > Spin locks
- > ...etc

### ***Test Your Application***

Now that you have determined your systems mode, upgraded the environment and migrated the application to take advantage of the resources available, it is time to test the application. Be sure to test your application and validate that the environment is operating as expected before moving your application into a production environment.

## **SUMMARY**

This whitepaper highlights the benefits of migrating to a 64-bit environment. It explains how OpenEdge has provided customers with the ability to easily migrate their 32-bit applications to a 64-bit environment and discusses the potential performance benefit you may see by taking advantage of the capabilities provided by 64-bit systems.

The market trends show UNIX vendors dropping their 32-bit-only support since 2006. Today it is commonplace to see large amounts of memory in all machines from laptops to desktops to servers due to the sharp decrease in memory prices over the last decade. However, to make the most of this memory you need to migrate your applications to 64-bit.

To help our customers take advantage of the new 64-bit architecture, this whitepaper has highlighted the benefits of migrating to a 64-bit environment and explained how to easily migrate OpenEdge 32-bit applications to a 64-bit environment and take advantage of the capabilities, including the performance benefits, provided by 64-bit systems.

While Progress makes this migration straightforward, as this whitepaper has shown, it also offers consulting services to help with migrating from a 32-bit environment to a 64-bit environment. Please contact your local sales representative for more information.

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## OTHER RESOURCES

### ***Documentation***

- > **Product/Platform Availability**  
[web.progress.com/customer-service/product-life-cycle.html](http://web.progress.com/customer-service/product-life-cycle.html)
- > **Product Lifecycle**  
[www.progress.com/progress\\_software/products/docs/lifecycle.pdf](http://www.progress.com/progress_software/products/docs/lifecycle.pdf)

## APPENDIX A

### ***Programming Language Considerations***

Converting application software written in a high-level language from a 32-bit architecture to a 64-bit architecture varies in difficulty. One common recurring problem is that some programmers assume that pointers have the same length as some other data type. They assume they can transfer quantities between these data types without losing information. These assumptions happen to be true on some 32-bit machines, but they are no longer true on 64-bit machines.

In most programming environments on 32-bit machines, pointers, “int” types, and “long” types are all 32-bits wide. However, in many programming environments on 64-bit machines, “int” variables are still 32-bits wide, but “long’s” and pointers are 64-bits wide. These are described as having an LP64 data model. Many 64-bit compilers today use the LP64 model (including Solaris, AIX, HP-UX, Linux, and IBM z/OS native compilers).



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## PROGRESS SOFTWARE

Progress Software Corporation (NASDAQ: PRGS) is a global software company that enables enterprises to be operationally responsive to changing conditions and customer interactions as they occur. Our goal is to enable our customers to capitalize on new opportunities, drive greater efficiencies, and reduce risk. Progress offers a comprehensive portfolio of best-in-class infrastructure software spanning event-driven visibility and real-time response, open integration, data access and integration, and application development and management—all supporting on-premises and SaaS/cloud deployments. Progress maximizes the benefits of operational responsiveness while minimizing IT complexity and total cost of ownership.

## WORLDWIDE HEADQUARTERS

Progress Software Corporation, 14 Oak Park, Bedford, MA 01730 USA  
Tel: +1 781 280-4000 Fax: +1 781 280-4095 On the Web at: [www.progress.com](http://www.progress.com)

For regional international office locations and contact information, please refer to the Web page below:

[www.progress.com/worldwide](http://www.progress.com/worldwide)

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