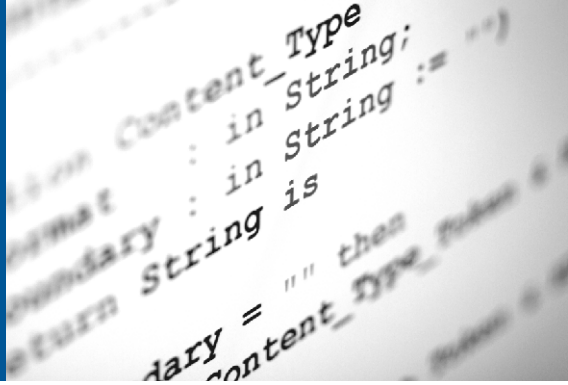
GNAT Pro insider

an AdaCore Publication
April 2005
www.adacore.com



newsflash

▶ **Ada 2005–**
Coming soon to a screen near you!
Go to the AdaCore web page, **www.adacore.com/ada_2005.php** to learn about Ada 2005: a bit of history, a summary of AdaCore's role, a description of some of the new features, and links to information about the language and its implementation in GNAT.

▶ **GNU / Linux is most widely used GNAT Pro platform**
The answer to the question "Where's Ada?", at least for GNAT Pro, is "Most often, on GNU / Linux". This native platform continues to be the most popular, in terms of subscription revenue.

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GNAT Pro 5.03: New Platforms, New Tools and New Ada 2005 Support

The latest version of the GNAT Pro toolsuite offers close to 100 new features including support for new platforms and targets, the introduction of the gnatmetric and gprmake tools, and support for many of the new Ada 2005 features. The GNAT Pro list of supported platforms and targets continues to grow with the addition of PowerPC Darwin for Mac OS X users, ERC32 targets for the space market, and Pentium targets for VxWorks, among others.

Integrated into the GNAT Pro toolset, gnatmetric calculates a set of commonly used industry metrics that allow you to better understand the structure of your source code and to satisfy the requirements of certain software development frameworks. The gprmake tool provides gnatmake-like multi-language build capabilities based on GNAT project files.

AdaCore is directly involved with the Ada 2005 language amendment process, and has been steadily implementing the approved new Ada 2005 features. Details of the new features already implemented in GNAT may be found in Javier Miranda and Ed Schonberg's paper *GNAT and Ada 2005*, available from our web page.
www.adacore.com/ada_2005.php

GNAT Pro 5.03 also offers greater efficiency, with Zero Cost Exceptions support now available on many more platforms including certain cross configurations. With the 5.03 back end based on gcc 3.4, users will also see a more mature technology.

Dynamic Plug-in Loading with Ada

Maintenance of high-availability systems (e.g., servers) requires the ability to modify, enhance, or correct parts of the application without needing to shut down and re-link the entire system. This is relatively straightforward in an interpreted or virtual-machine based language such as Java, in which new code is loaded upon demand. In a language with static executable images this capability can be realized though dynamically loaded / linked libraries ("DLLs"). However, in practice this causes problems, because the protocol for invoking subprograms in a DLL is very low-level and sacrifices type safety.

Object-oriented programming makes this approach practical by using dynamic dispatching to invoke dynamically loaded functions with a more robust, high-level protocol. In an OO paradigm, a "plug-in" contains new classes that enrich the class set of the original application. Calls to subprograms in the shared library (plug-in) are done implicitly through dynamic dispatching which is much simpler, more transparent to the programmer, more type-safe, and thus much safer. A paper by Cyrille Comar and Pat Rogers shows how Ada– a statically-typed, statically-built, object-oriented language– can fully implement dynamic plug-ins as in Java, but without needing to rely on a comparatively inefficient virtual machine. This paper, which will be available on the AdaCore website, shows how to use GNAT Pro to build an extensible application and illustrates adding new functionality at run time through plug-ins, without needing to shut down the program.

In the GNAT Pro Pipeline: Here's a look at some upcoming products and developments.

New Platforms

GNAT Pro is being ported to new operating systems and several 64-bit architectures. On the native systems side, after the 64-bit SPARC Solaris port and the Mac OS X ports that are already available to customers, there will be several GNAT Pro ports for IA-64 Itanium. These include OpenVMS for HP's Integrity Servers, and GNU Linux for SGI's Altix. We have also started to look into AMD's Opteron and Intel's EMT64 processors.

In the embedded market we have completed a bare-board port to the ERC32, a SPARC-based radiation-hardened chip, and we are working on a GNAT Pro implementation for VxWorks 6 and VxSim for VxWorks 653 from our tools partner Wind River Systems. We are also adding AltiVec support in GNAT Pro. This will allow Ada developers to target the PowerPC AltiVec extension via an efficient high-level API that can also be run in emulated mode on a native system to perform testing and to verify algorithmic correctness.

New tools for safety-critical systems

We will be enhancing the GNAT Pro High-Integrity Edition, with several new static analysis tools under development. One is gnatcheck, which analyzes a unit and identifies all potential violations of programmer-defined safety rules. Another tool that we are looking into is a call-graph analyzer that determines the per-task potential maximum stack size.

New support for multi-language applications

Customers who are using a combination of Ada, C, and C++ will soon be able to enjoy a new build facility that will make building a large multi-language system as easy as building one that is Ada-only.

New tools in GPS

On the IDE side, GPS 3.0 will add a variety of features including a new visual diff tool, a documentation generator, and enhanced support for client-server configurations.

Ada Academic Initiative > > > > > > >

Launched last year, AdaCore's **GNAT Academic Program ("GAP")** continues to expand and now comprises more than 70 universities from around the world. By joining this program, educational institutions receive our GNAT Academic Edition, including online support, and can use and contribute to a growing collection of Ada teaching resources. Following a request from several GAP members interested in introducing Ada 2005 in their curricula, AdaCore released a new version of the GNAT Academic Edition late last year. This release implemented a number of new Ada 2005 features and included an updated set of tools and libraries and a new version of GPS. It has received an enthusastic response and is helping to spread the message that Ada is a living, modern language, evolving to meet the requirements of 21st century software development and computer science education.

Through the GAP program, we are coordinating our academic support with our tools partners. In addition to the joint project with Praxis High Integrity Systems, announced in the November 2004 issue of *GNAT Pro insider,* we are establishing initiatives with ARTiSAN Software and IPL. This will help bring to the Ada academic community some of the best and most modern software development tools available. A soon-to-be-launched element of our academic initiative is the Ada Intern Program, which will allow our customers to learn about Ada-knowledgeable students who are interested in Ada-oriented internship positions. Details of how to participate will soon be posted on the GAP web pages.

The GAP program is shaped by suggestions from the academic community. To ensure an effective dialog, AdaCore has hosted meetings in Paris and New York and organized a Birds-of-a-Feather session at SIGAda 2004 last November; we will likewise be conducting a forum at the Ada Europe meeting in York (UK) in June. Current or prospective GAP members are encouraged to participate.

For up-to-date information on all of these activities and more, please visit the GAP page, **www.adacore.com/academic** on AdaCore's website.

AdaCore at the Ada Europe 2005 Conference

As befitting our leadership role in the Ada community, AdaCore will have a major presence at this year's Ada Europe conference in York, UK: a vendor exhibit, a GAP forum, five papers, and two tutorials.

The papers cover a variety of topics:
Gary Dismukes and Javier Miranda, ***Ada 2005 Abstract Interfaces in GNAT***

Pat Rogers (with Andy Wellings, Univ. of York), ***The Application of Compile-Time Reflection to Software Fault Tolerance using Ada 95***

José Ruiz, ***GNAT Pro for On-Board Mission-Critical Space Applications***

Ben Brosgol, ***A Comparison of the Mutual Exclusion Features in Ada and the Real-Time Specification for Java***

Roman Berrendonner, Jerome Guitton, and Nicholas Roche, ***ERB: The ESA Ravenscar Benchmark***

The tutorials are:
Ben Brosgol, ***Real-Time Java for Ada Programmers***

Pat Rogers, ***Software Fault Tolerance***

Interview with Franco Gasperoni
Managing Director, AdaCore Europe

GNAT Pro insider: Tell us a bit about your background, how you came to be involved with Ada and AdaCore, and what your current role is.

Franco Gasperoni: I had the good fortune to grow up in three different cultures: Italian, French, and American. The cultural diversity in which I was raised, coupled with my mother being a writer and a great story teller, helped foster my interest in languages. Add to that my father's foresight in giving me the opportunity to learn about the first 8-bit microprocessors, and you end up with a person interested in languages and computers. During my first couple of years in the United States, as a graduate student at New York University, I studied Artificial Intelligence and Natural Language Processing. But I was also fascinated with programming languages and compilers. Ada was the fourth programming language that I learned, after Basic, FORTRAN, and Pascal. Many others have followed since: C, C++, Lisp, Scheme, SETL, ML, Java, etc. Of the programming languages that I know, Ada is the one that I like best. After I completed my PhD thesis on compilation techniques for VLIW (also known as EPIC) architectures, Ed Schonberg, my thesis advisor and one of AdaCore's founders, asked me to investigate combining an Ada front end with the GCC back end. That was the beginning of the original GNAT project.

Things have very much evolved since then with the creation and continued worldwide growth of AdaCore. Along with Cyrille Comar, I was co-founder of AdaCore in Europe (then known as ACT-Europe), where I serve as Managing Director.

GNAT Pro insider: You have a lot of direct contact with customers. Why have they chosen to use Ada and GNAT Pro for their applications?

Franco Gasperoni: Ada started as a reliable, portable programming language with built-in safety nets that ease the construction and maintenance of mission and safety-critical systems. For some this is Ada's key advantage. Others, wanting to leverage on object-oriented programming in a safe and reliable fashion, find that Ada 95 gives them an extra competitive advantage. This is particularly true among our financial and media / television customers. Other customers in the avionics and defense sectors appreciate the safe and deterministic real-time capabilities built into Ada 95. However, a great language is not going to prosper without a high-quality implementation. In this respect Ada 83 was ahead of its time. Today, GNAT Pro is what makes developing systems in Ada a gratifying experience. This is what our customers tell us.

At AdaCore we have always aimed at making GNAT Pro a complete Ada solution, not only a first class tool suite. Thus a GNAT Pro subscription comes with support and Ada online consulting straight from AdaCore's developers and experts.

Incidentally, one of our difficulties at the sales and marketing level is conveying to future customers how different GNAT Pro is from other software development environments, regardless of the programming language. Developers, especially in the C and C++ arena, are used to spending precious time trying to understand how to best use and deal with the specifics of their development kits. GNAT Pro customers have a very different experience. When a GNAT Pro user has a question or problem, or is simply curious about an aspect of Ada or our technology, he or she simply fires off an e-mail to our experts and receives an answer in a matter of hours, often minutes.

GNAT Pro insider: AdaCore continues to thrive as an international Ada-centric software company: developing products from a multi-national team, and marketing them to a global user community. How do you explain AdaCore's success?

Franco Gasperoni: Innovation, innovation, innovation. Innovation in our Ada focus and business model purely based on Free Software. Innovation in our tool suite and in bringing new tools to Ada developers. Innovation in quality assurance procedures: our automated QA setup allows us to test changes and enhancements to our products by running extensive suites comprising more than 30 000 tests and 6 million lines of Ada 83 and Ada 95. Innovation in the way we work internally at AdaCore: no engineer has left the company since its inception. Innovation in customer relations: front-line support and online Ada consulting come straight from AdaCore's developers and experts. This dialogue between GNAT Pro users and our team of experts makes our customers more productive and gives us important feedback that spurs future innovations.

GNAT Pro is a Winner in Datamation "Product of the Year" Contest

Ada, thanks in part to GNAT Pro, is no longer the best-kept secret in software development. Users are taking notice, and GNAT Pro was nominated for "Product of the Year" in the category "Enterprise Linux Application". Despite competing against products that are much better known and that have a much broader user base, GNAT Pro showed its mettle and finished in a tie for 3rd place with Novell's SUSE Linux Enterprise Server 9.

Photo: Gary Matoso

Ada 2005 Goes Truly International

Ada 2005 introduces a new type Wide_Wide_Character that can accomodate up to 2**31-1 different character values. The 16 bits of Wide_Character are just not sufficient these days if you really want to handle all the languages in the world, not to mention such character sets as the Byzantine Musical Symbol set, and a full set of mathematical symbols.

With this addition, Ada can handle the full Unicode character set (see **www.unicode.org** for information about Unicode). Not only can all these characters be freely used in data, but now identifiers can make full use of different languages. For example, the Katakana Middle Dot character can now serve as an underscore, and the case equivalence concept now extends to other languages where it makes sense, such as Greek and Cyrillic. Although professional programmers in most countries generally seem to stick to English, students can particularly benefit from being able to write identifiers in their native language, and, as we are finding out from the GAP program, Ada has a presence in universities all over the world.

The most recent development versions of GNAT fully support these extensions, as well as a new package GNAT.UTF_32 that allows an application program to handle Unicode character categories. GNAT also fully supports the UTF-8 encoding system, which is rapidly becoming the preferred external representation for large character sets.

AdaCore at Conferences, April – October 2005

▶ **SSTC 2005 (Systems and Software Technology Conference)**
18–21 April 2005 / Salt Lake City, Utah (USA)
www.stc-online.org
We will be exhibiting here, with a focus on the latest developments in the GNAT Pro High-Integrity Edition. Pat Rogers will be giving a Vendor Track presentation on GNAT Pro for Safety-Critical Systems and will also be conducting a GPS demonstration. Visit us at Booth #431.

▶ **Wind River 2005 Worldwide Partner Conference, 22–25 May, 2005 / Orlando, Florida (USA)**
www.windriverevents.com/userconference05
We will be exhibiting here and also presenting a paper:
Pat Rogers, *GNAT Pro for Safety-Critical Systems*

▶ **DASIA 2005 (Data Systems in Aerospace), 30 May–2 June 2005 / Edinburgh, Scotland**
perso.wanadoo.fr/eurospace/dasia.html
We will be exhibiting at this conference, and several AdaCore authors will be presenting papers:
José F. Ruiz, *Mission-Critical On-Board Software Using the Ada 95 Ravenscar Profile*
Romain Berrendonner and Jerome Guitton, *ERB: An Ada 95 Ravenscar Benchmark for Space Applications*

▶ **Ada Europe 2005, 20–24 June 2005 / York, England (UK)**
www.ada-europe.org/conference2005.html
We will be exhibiting at this conference, and several AdaCore authors will be presenting papers and delivering tutorials. A separate article on page 2 of this issue provides details.

▶ **GCC Developers' Summit, 22–24 June / Ottawa, Canada**
www.gccsummit.org/2005
AdaCore will be participating in this conference and presenting a paper on stack size analysis.

▶ **The Open Group, IT Architecture Practitioners Conference,18–20 July, New York, NY (USA)**
www.opengroup.org/new-york2005
Robert Dewar will be overseeing a session on Open Source software for High-Assurance systems.

newsflash

▶ **IPL adds GPS interface to AdaTEST**
AdaCore's GPS IDE continues to show its extensibility and tailorability, as third-party developers make their tools invokable from the GPS user interface. A recent example is IPL, **www.ipl.com** and their AdaTEST product, a tool that facilitates and automates the testing of Ada programs. With the integration of AdaTEST 95 into GPS, you can now organize and perform test activities directly, within the IDE, simplifying development and improving productivity.

▶ **Ada Answers website expands**
The Ada Answers website **www.ada-answers.com**, established by AdaCore to help publicize and promote Ada usage, has added some new video material. A series of lectures on Ada given by AdaCore CEO Robert Dewar at MIT, as well as two new Ada application videos, are now available. We are always looking for new information for the Ada Answers site, so please contact us if you have an Ada success story that you would like to publicize.

▶ **AdaCore partners with ARTiSAN Software**
AdaCore and ARTiSAN Software **www.artisansw.com**, a global leader for UML-based, real-time systems and software modeling tools, have announced plans to enter into a strategic partnership. The companies' products nicely complement each other, and the combination of GNAT Pro and ARTiSAN's Real-Time Studio will provide full software life cycle coverage for Ada developers.

The GNAT Pro insider is published twice a year simultaneously in New York and Paris by AdaCore
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