Ada, GNATurally!
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Outline of presentation

- **Introduction**
  - Who is AdaCore?
  - What is GNAT Pro?
  - “Open Source” approach
  - Applications and customers

- **Technology**
  - GNAT Pro basic components
  - GNAT Programming System (GPS) IDE
  - Project facility
  - Tools and libraries
  - Platforms
  - High-Integrity Edition

- **“Customercentricity”**
  - GNAT Tracker
  - On-line consulting / support
  - Quality assurance
  - Additional services
  - Training
  - Documentation

- **Ada advocacy**

- **Conclusions**
Who is AdaCore?

- **AdaCore = Ada Core Technologies + ACT Europe**
  - Separate legal entities but single organization
  - Founded in 1994 (US) and 1996 (Europe)
    - Robert Dewar, Edmond Schonberg, Richard Kenner in US
    - Cyrille Comar, Franco Gasperoni in Europe
  - Staff comprises around 40 people worldwide, mostly technical
    - *Extreme* Ada and compiler expertise

- **Flagship product is GNAT Pro**
  - GUI-based Integrated Development Environment
  - Full Ada (core language + all annexes)
  - Toolchain / libraries / bindings
  - On-line consulting / support
  - Documentation
  - Add-ons
  - On-site training in Ada and/or tools
AdaCore software is “Open Source”

- Business model, not a religion
  - No intrinsic connection between product quality and use of open-source versus proprietary software
  - We use open source model / gcc technology because it makes good business sense for us and our customers

- Benefits to AdaCore
  - Allows leveraging gcc code generator experience
  - Ease of interfacing with other gcc languages
  - Pool of university graduates familiar with our technology
  - Makes GNAT the Ada technology of choice for university research

- Benefits to customers
  - Availability of run-time library sources
  - Lower risk
  - No problem developing proprietary or classified software
  - No need to expose source code
domains and customers (partial)

**Application domains**
- Air traffic control
- Avionics (civil, military)
- Communications
- Defense
- Electronics
- Energy
- Financial institutions
- Medical imagery
- Space
- Telecom
- Television
- Transportation

**Customers**
- Alcatel
- Alstom Transport
- BAE Systems
- Boeing
- Canal+ Technologies
- EADS
- Ericsson
- Eurocontrol
- JEOL
- Lockheed Martin
- Philips Semiconductor
- Raytheon
- Rockwell Collins
- Saab
- Smiths Aerospace
- THALES
GNAT Pro basic components

- Integrated Development Environment
  - GPS (GNAT Programming System)

- Compilation tools
  - gcc
  - gnatbind
  - gnatlink
  - gnatmake

- Project facility
  - Management of settings used for program builds

- Debugger
GNAT Pro compilation model
**GPS IDE**

- **Functionality**
  - Context-sensitive, language-aware, configurable editor
  - GNAT Pro Ada compilation system
  - Visual debugger
  - Source browsing / navigation facility
  - Interface to source configuration management tools
  - Control over project settings
  - Pretty printing / reformatting
  - Control over window topography

- **Attributes**
  - Intuitive, easy to use
  - On-line help includes access to source files for predefined libraries (in GPS 2.1)
  - Configurability, extensibility through scripting
Project facility

• Introduction
  ▪ A *project* is a configurable set of properties for a collection of source files
  ▪ Developer can specify
    - Directories for source files, objects, executables
    - Source file naming conventions (per-unit or global)
    - Switch settings
  ▪ Access to command-line switches, environment variables
  ▪ Hierarchical organization
    - Project may inherit / override source files from parent project
  ▪ Project may import other projects containing required source files

• Some uses
  ▪ Common set of sources generates object files in different directories, via different switches
  ▪ Multiple versions of the body for a package spec
GNAT Pro tools (1)

• Monitoring
  ▪ gnatmem (heap monitor)
  ▪ GNAT.Debug_Pools (diagnose heap problems)
  ▪ gprof (profiler)

• Reducing code space
  ▪ gnatelim (minimize executables)

• Testing
  ▪ gcov (test coverage)
  ▪ aunit (test harness)

• Browsing
  ▪ gnatxref (cross-referencer)
  ▪ gnatfind (definition / use finder)
  ▪ gnatls (library browser)
GNAT Pro tools (2)

- **Documentation**
  - gnathtml *(HTML generator)*

- **Utilities**
  - gnat.chop *(file splitter)*
  - gnat.kr *(file name “kruncher”)*
  - gnat.prep *(preprocessor)*
  - gnat.stub *(body generator)*
  - gnat.pp *(pretty printer)*
  - gnat.clean *(delete intermediate files)*
  - gnat.metric *(metrics tool, coming in GNAT Pro 5.03a)*

- **Distributed systems**
  - GLADE
  - PolyOrb
GNAT Pro libraries

- **Bindings**
  - GtkAda
  - X/Motif
  - AWK-like parsing functions
  - CGI support
  - Tcl expect
  - Win 32 / COM / DCOM

- **Sorting**
  - Bubble sort
  - Heap sort

- **Data structures**
  - Dynamic arrays
  - Hash tables

- **String handling**
  - Regular expressions
  - SPITBOL
  - Other utilities

- **ASIS**

- **Other**
  - Calendar
  - Locking / Tasking
  - Command line
  - Directory operations
  - I/O
  - OS Interface
  - Exception utilities
  - Floating point coprocessor control
  - Source file info
  - Spell checker
  - Debugging
  - Interfacing
GNAT Pro platforms

• Native
  - Alpha OpenVMS
  - Alpha Tru64
  - MIPS IRIX
  - PA-RISC HP-UX
  - PowerPC AIX
  - SPARC Solaris
  - x86/Pentium GNU Linux
  - x86 Windows
  - x86 Trusted Solaris

• High-Integrity Edition
  - DO-178B VxWorks/Cert
    - PowerPC (Solaris hosted)
    - PowerPC (x86 Windows)
  - VxWorks AE653
    - PowerPC (Solaris hosted)
    - PowerPC (x86 Windows)

• Cross / Tornado
  - SPARC Solaris ⇒ 68K
  - x86 Windows ⇒ 68K
  - SPARC Solaris ⇒ PowerPC
  - x86 Windows ⇒ PowerPC
  - x86 Windows ⇒ StrongARM/XScale
  - SPARC Solaris ⇒ UltraSPARC

• LynxOS
  - Native x86
  - SPARC Solaris ⇒ PowerPC

• Ports in progress
  - Mac OS X
  - SGI Altix
  - SPARC Solaris ⇒ x86 VxWorks
• **Enforcement of selected profile**
  - High-Integrity profiles
    - Zero Footprint
    - Cert
    - Ravenscar
  - Full-Runtime

• **Allowance of user-specified profile**
  - Run-time libraries selected *à la carte*, based on features actually used in the program

• **Platform / application**
  - Wind River Platform for Safety Critical ARINC 653
  - Boeing 7E7 Dreamliner Common Core System (Smiths Aerospace)

• **Status**
  - Certification materials (DO-178B, Level A) for Ada libraries will be available in early 2005
GNAT Pro High-Integrity Edition (2)

- **Product highlights**
  - Binding to ARINC 653 Application Executive (APEX)
  - Support for AE653 partition types

- **Compiler features relevant to High-Integrity development**
  - Generation of human-readable low-level intermediate representation (-gnatD, -gnatG)
  - Generation of human-readable data layout information (-gnatRi)
  - Generation of assembly language listing
  - Restrictions identifiers for implicit loops or conditionals
  - Restrictions identifier for form of explicit conditionals
  - Style checks (-gnatyi)
“Customercentricity”

- **On-line consulting / support**
  - Immediate response to user questions on any aspect of Ada or GNAT Pro
  - Prioritized bug-tracking system overseen by CEO
  - Wavefronts

- **Quality assurance process**
  - Report tracking
  - Configuration management
    - Attempted check-in triggers regression test
  - Nightly builds with extensive testsuites
    - ACATS
    - Internal tests
    - Customer-supplied tests
    - Bootstrap
GNAT Tracker

- Secure web-based customer interface
- Download of GNAT Pro tool suite and components
- Online version of GNAT Pro documentation
- Submit toolset support or online consulting requests
- Download of GNAT Pro releases
- Access to up-to-date versions of known-issues and features
- Browse/search all request exchanges for your account
Additional services

• GNAT consulting

• On-site courses
  ▪ Introduction to GNAT Pro and GPS
  ▪ Introduction to GNAT Pro and GPS for AE653
  ▪ Ada Programming with GNAT Pro: Fundamentals
  ▪ Ada Programming with GNAT Pro: Advanced Topics
  ▪ Ada Programming with GNAT Pro: Beyond Ada 83

• Professional services
  ▪ GNAT Pro ports
  ▪ Special-purpose run-time libraries
  ▪ Tool customization and enhancements
  ▪ Assistance with in-house specialized GCC and GNAT ports
Documentation

- Ada language

- GNAT Pro
  - GNAT Pro User’s Guide for Native Platforms
  - GNAT Pro User’s Guide for Cross Platforms
  - GNAT Pro Reference Manual
  - GNAT Pro High-Integrity Edition User’s Guide
  - GPS User’s Guide
  - GPS Tutorial

- ASIS for GNAT
  - User’s Guide
  - Reference Manual

- GNU tools
  - GCC
  - GDB

Documentation is on-line, hard copy, or both
Ada advocacy

- **Ada Answers** - [www.ada-answers.com](http://www.ada-answers.com)
  - Summary of Ada’s technical and business benefits
  - Vendor-neutral testimonial videos from Ada users
  - Summary of who’s using Ada

- **GNAT Academic Package**
  - AdaCore serves as clearinghouse of resources for universities using Ada for teaching or research
  - On-line GNAT and Ada technical support

- **Ada Resource Association** – [www.adaresource.com](http://www.adaresource.com)
  - Preserves Ada “infrastructure”
    - Maintenance of Ada language standard
    - Ada IC / ARA website
  - Promotes / publicizes Ada
    - SIGAda booth at tradeshows
    - Success stories
Conclusions

• AdaCore is stable, established, committed to Ada
  ▪ Steady growth since its inception
  ▪ Excellent retention of technical staff

• GNAT Pro is high-quality product
  ▪ Excellent reputation among customers
  ▪ Continued enhancements

• GNAT Pro comes with expert support
  ▪ Support staff = developers

• AdaCore supports Ada 2005
  ▪ Several GNAT Pro features have influenced Ada 2005
  ▪ GNAT Pro implements many Ada 2005 features now

“Your safe choice for Ada tools”