DEVELOPER TOOLS UPDATE

ADA EUROPE 2018

Shawn Fanning
Software Development Director
PTC Developer Tools

Ada Europe 2018 – Lisbon Portugal – June 2018

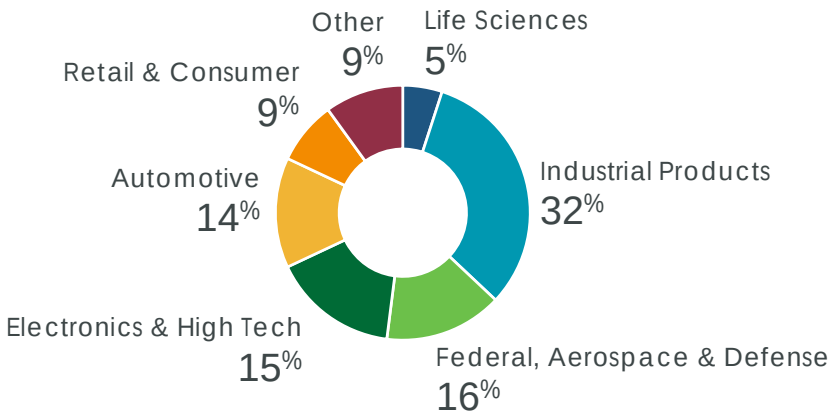
ptc

- Global Software Company, $1B+ Revenue
- Design, Manufacture, Operate, and Service “Things”
- Leading Industrial Innovation Platform and Solutions
- Global Network of 400K+ Developers and 1K+ Partners

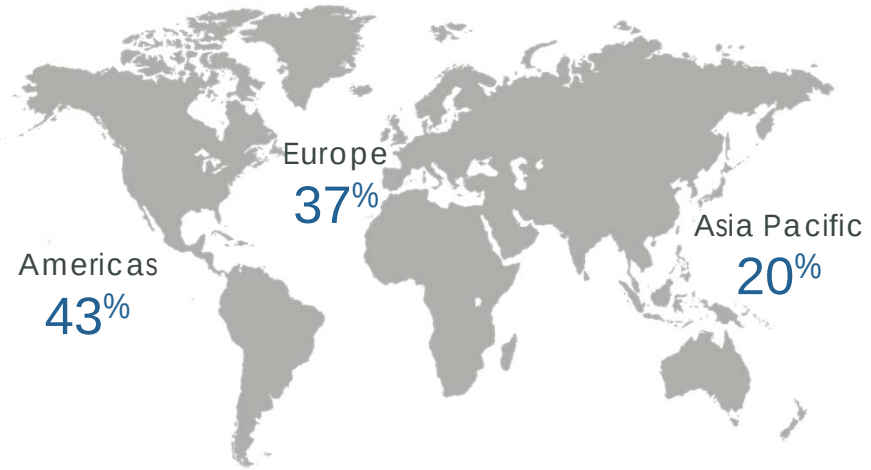
The Boston Globe
TOP PLACES TO WORK
2017

WE ARE A GLOBAL TECHNOLOGY COMPANY

REVENUE BY VERTICAL

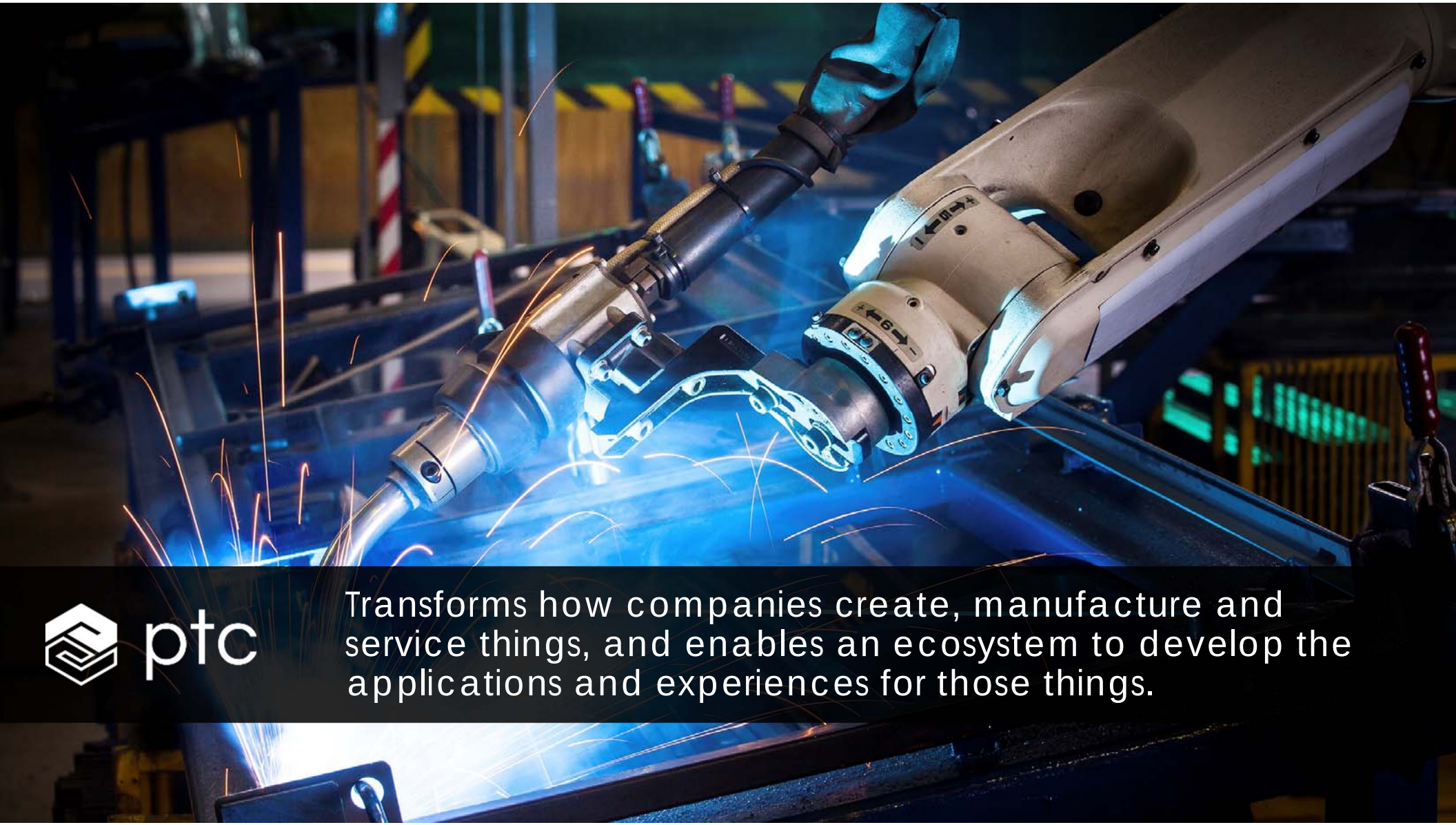


REVENUE BY REGION



FAST FACTS

$1.16B	6K	1K	400K
FY17 total revenue	employees	partners	ecosystem developers


ptc
Transforms how companies create, manufacture and service things, and enables an ecosystem to develop the applications and experiences for those things.

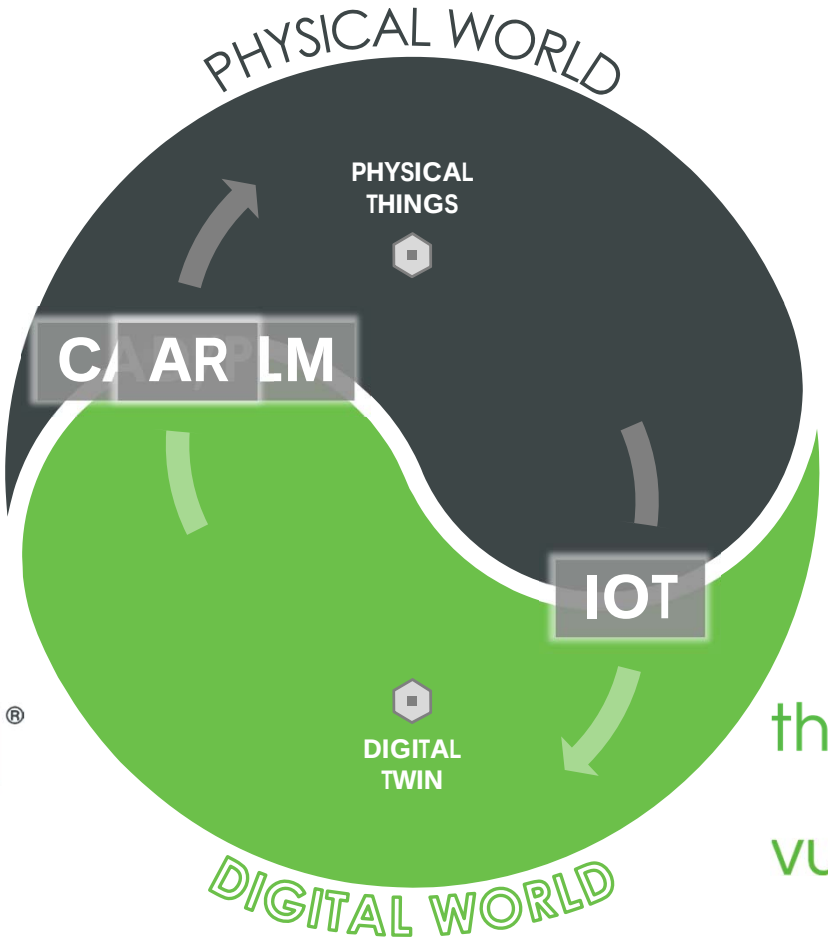
PHYSICAL DIGITAL CONVERGENCE SHAPED OUR STRATEGY

ptc

vuforia™

creo®

windchill®



kepware®

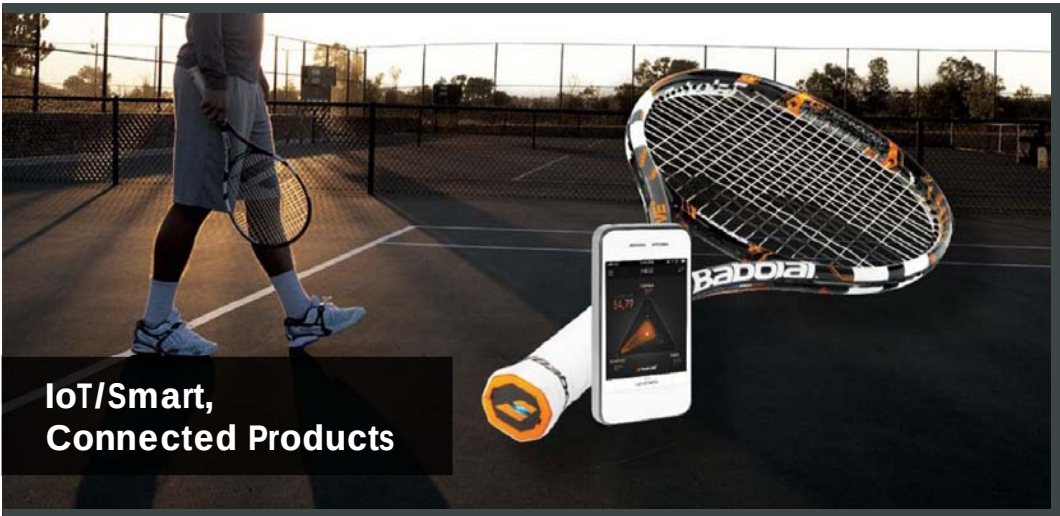
thingworx®

thingworx® analytics

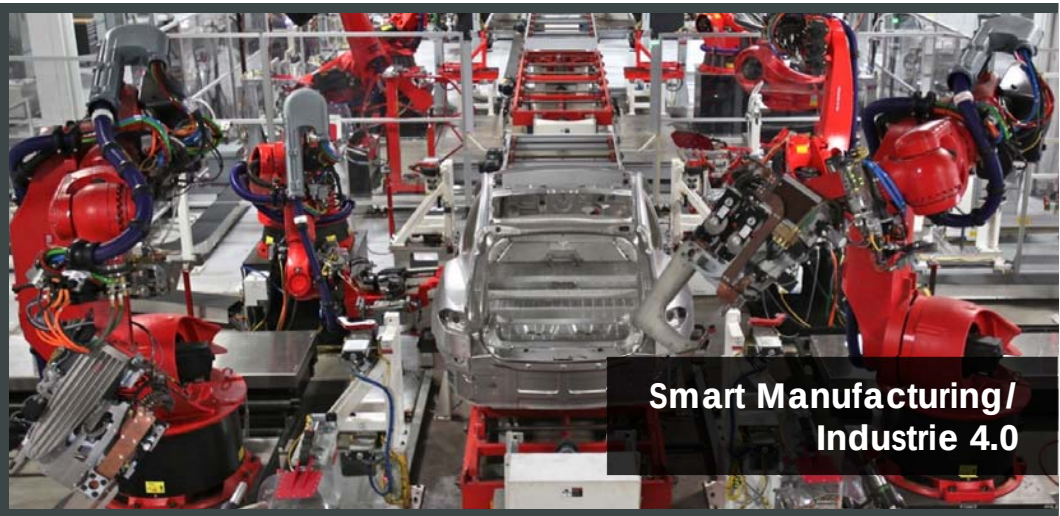
vuforia™ studio

PHYSICAL DIGITAL CONVERGENCE

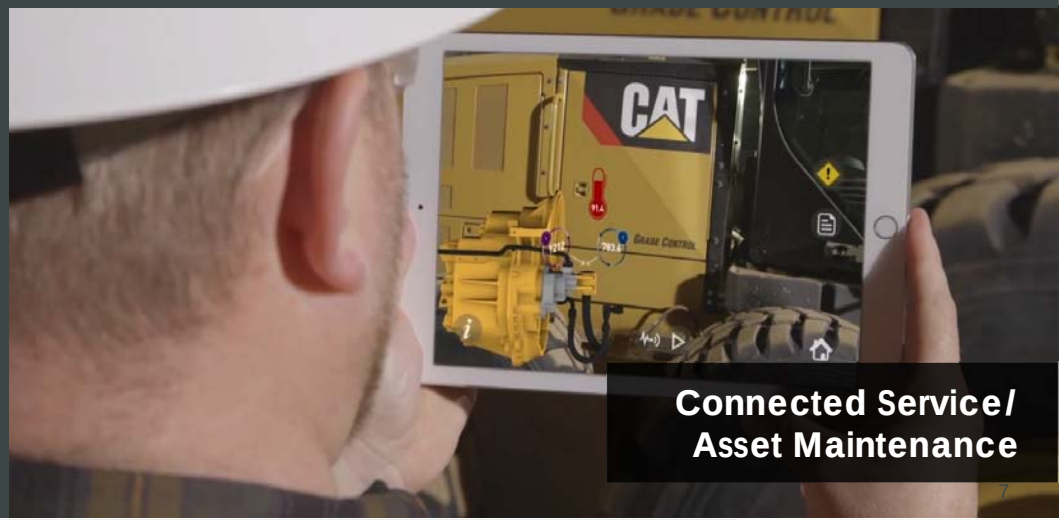
OPPORTUNITIES FOR INDUSTRIAL INNOVATION



IoT/Smart, Connected Products


Smart Manufacturing/ Industrie 4.0

Smart Cities, Fields, & Worksites



Connected Service/ Asset Maintenance

NEW STRATEGIC PARTNERSHIPS

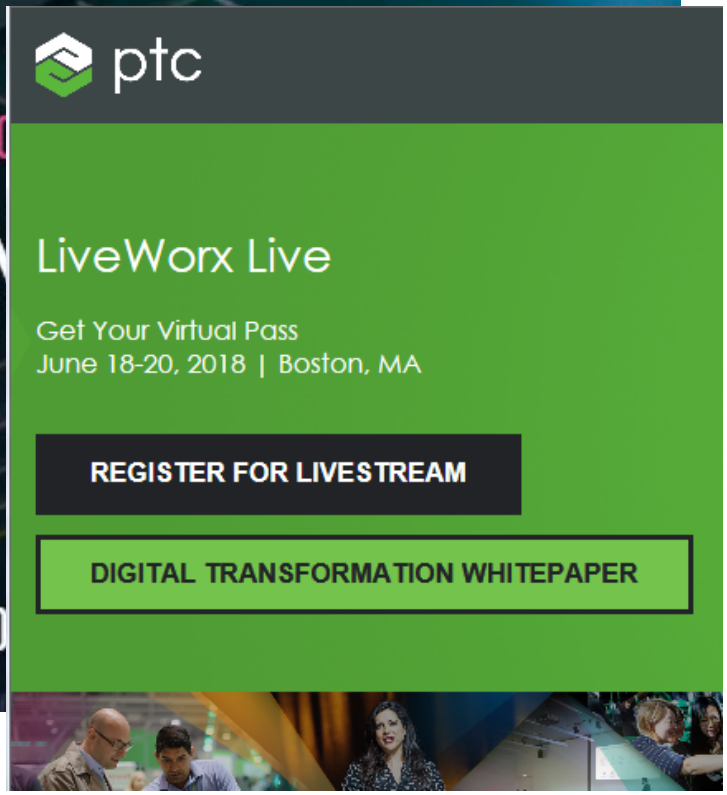
Microsoft

ThingWorx Industrial Innovation Platform on Microsoft Azure cloud platform

Rockwell Automation

ThingWorx IoT, Kepware industrial connectivity, Vuforia augmented reality combined with Rockwell Automation smart factory technologies

EXPLORE MORE - LIVEWORX 18



ptc
PTC Developer Tools
A Comprehensive Suite of Developer Tools for the Serious Engineer

PTC DEVELOPER TOOLS SOLUTIONS

ptc

Family of Ada compilers, runtime environments, and test tools for the development of complex applications

ptc® objectada®

ptc® apexada™

ptc® adaworld®

Family of real-time virtual machine and compilation technologies for the Java language

ptc perc®

ptc perc® 64

ptc

PTC Developer Tools

A Comprehensive Suite of Developer Tools for the Serious Engineer

ADA PRODUCTS UPDATE

June 2018

PTC ADA PRODUCT FAMILY OVERVIEW

ptc

ptc® apexada™

- ptc® apexada™ Developer
- ptc® apexada™ Embedded Developer

ptc® objectada®

- ptc® objectada® for Windows
- ptc® objectada® for Linux
- ptc® objectada® Real-Time
- ptc® objectada® Raven™

ptc® objectada® 64

- ptc® objectada® 64 for Windows

ptc® adaworld®

ptc

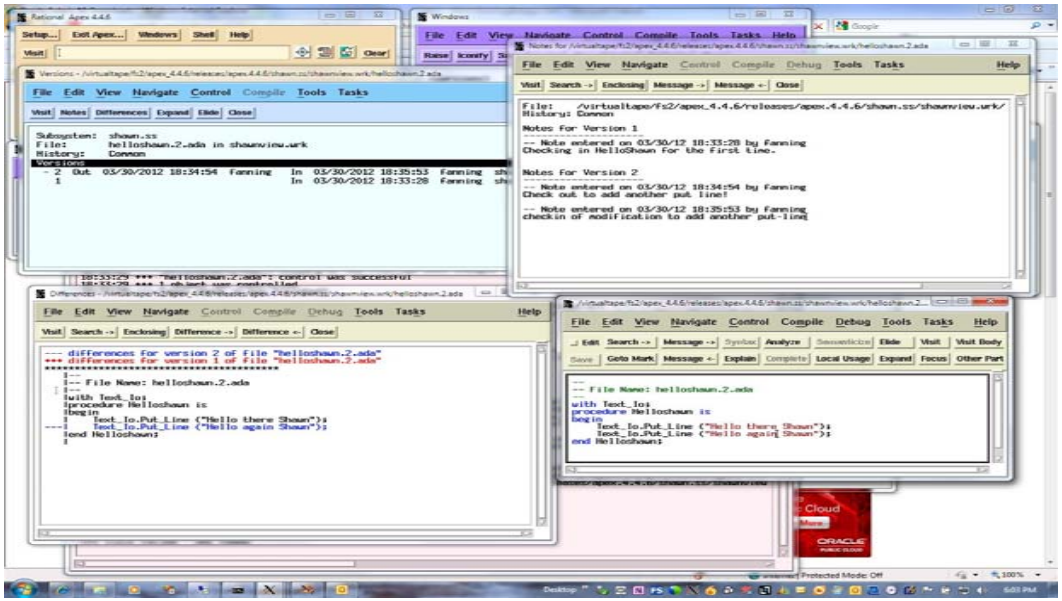
ptc® apexada™

PTC APEXADA OVERVIEW

ptc

- Ada 95 & Ada 2005 language support
- **ApexAda Developer** (native compilers):
  - Solaris SPARC
  - Solaris Intel
  - Linux Intel
- **ApexAda Embedded Developer** (embedded / cross compilers):
  - **VxWorks** *(Intel, PowerPC targets)*
  - **LynxOS** *(Intel, PowerPC targets)*
  - **ApexAda Exec** *(Intel ,PowerPC, MIPS bare-board targets)*
- Summit CM & TestMate test tools

ptc® apexada™

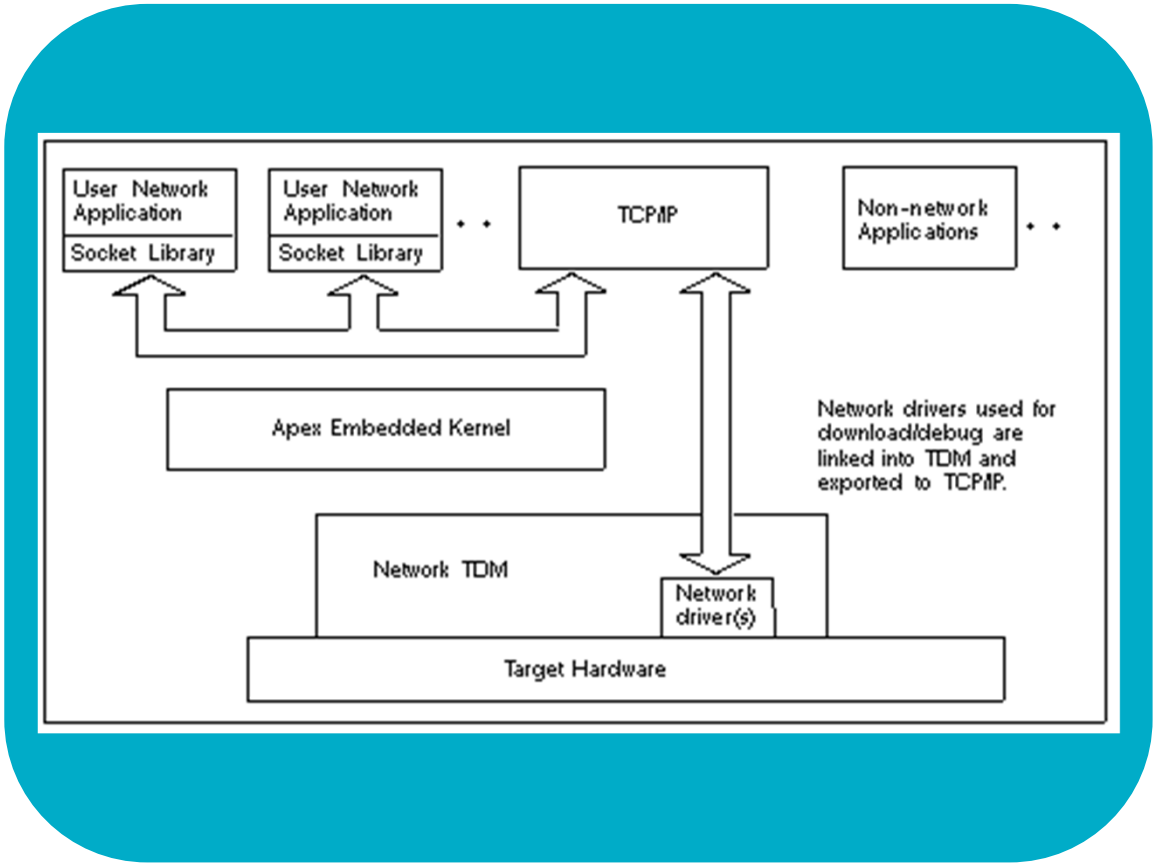


ptc

- **Includes 64-bit Linux native compiler**
- **Available Embedded cross compilers:**
  - Wind River **VxWorks V7/Intel 64** cross compiler
  - **ApexAda Exec/ Intel 64** bare-board cross compiler

Released May 2018

APEXADA V5.2 EMBEDDED EXEC/INTEL64



- 64-bit bare-board Ada runtime kernel for Intel X86_64
- Kernel support for interrupts, time, multiple threads of control
- Two kernel editions
  - Complete Ada tasking kernel
  - Smaller, sequential kernel
- Target Debug Monitor (TDM)
  - Supports download & debug
  - Serial edition / Network edition
- Enet TCP/IP TCP/UDP network stack

ptc

ptc® objectada®

PTC OBJECTADA PRODUCTS

ptc® objectada® / ptc® objectada® 64 for Windows

- Native compiler for Windows
- Ada 95, Ada 2005, Ada 2012 (subset) language support

ptc® objectada® for Unix / Linux

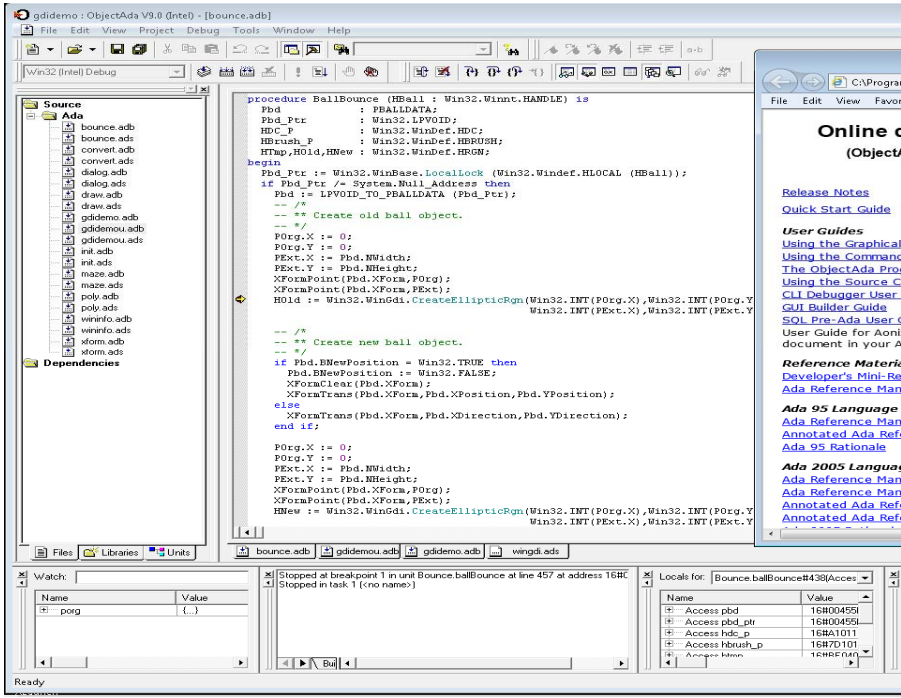
- Native compilers (*Solaris SPARC, Solaris Intel, AIX, HP-UX, Linux Intel*)
- Ada 95 language support

ptc® objectada® Real-Time™

- Cross development products - Real-time full Ada 95 runtime products
- VxWorks (*Windows host; Intel, PowerPC targets*)
- LynxOS (*Solaris, AIX, Linux host; PowerPC targets*)

ptc® objectada® Raven™

- Cross development products – safety-critical Ravenscar profile – restricted Ada 95 runtime
- Bare target (*Windows, Solaris host; PowerPC, Intel, ERC32 targets*)
- VxWorks 653 (*Windows host; PowerPC target*)



ptc® objectada®

PTC ObjectAda V10.0 is now available!

ptc

ptc® objectada® **for Windows V10.0**

ptc® objectada® 64 **for Windows V10.0**

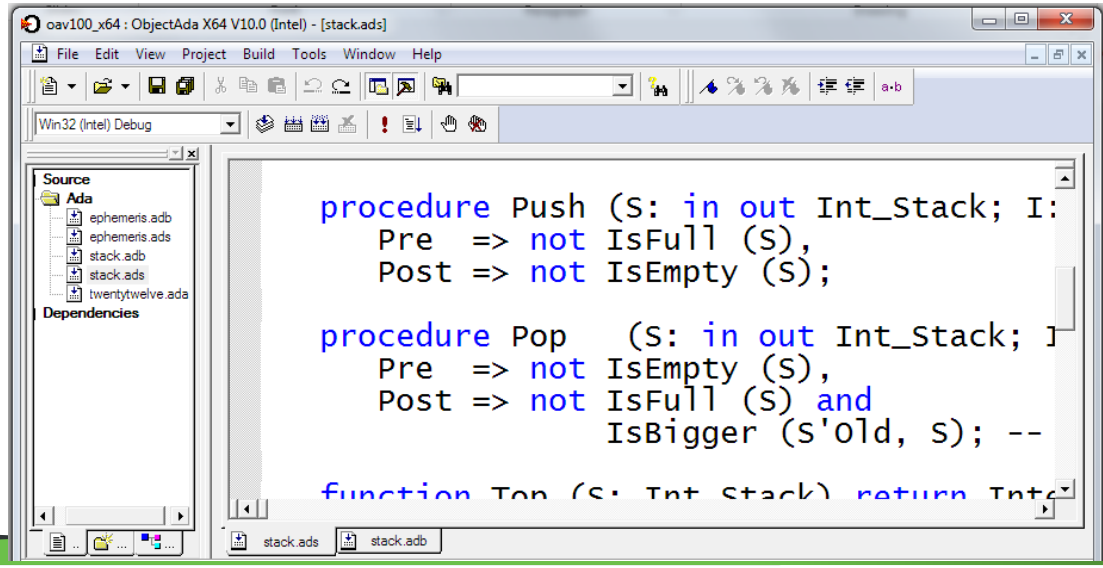
Released June 2018

- **32-bit / 64-bit application development & execution**
- **First increment of Ada 2012 language feature support**
- **Windows 10 compatibility** – also works with Windows 7 or later
- **Based on Visual C++ 2017 tools** and **Windows 10 SDK** libraries
- ADT Eclipse interface **works with latest Eclipse versions**

Visual Studio Partner

OBJECTADA V10.0 ADA 2012 SUPPORT

- Aspect specifications
- Dynamic contracts
  - Preconditions and Postconditions for subprograms
  - Assertions for types that are checked dynamically
- New flexible forms of expressions
  - If expressions
  - Case expressions
  - Quantified expressions
  - Expression functions
  - Generalized forms for membership tests
- Predefined program library extensions
  - Ada.Strings extensions / new child packages
  - Ada.Wide_Characters.Handling
  - Ada.Wide_Wide_Characters_handling
  - Ada.Directories extensions



ptc

PTC Developer Tools

A Comprehensive Suite of Developer Tools for the Serious Engineer

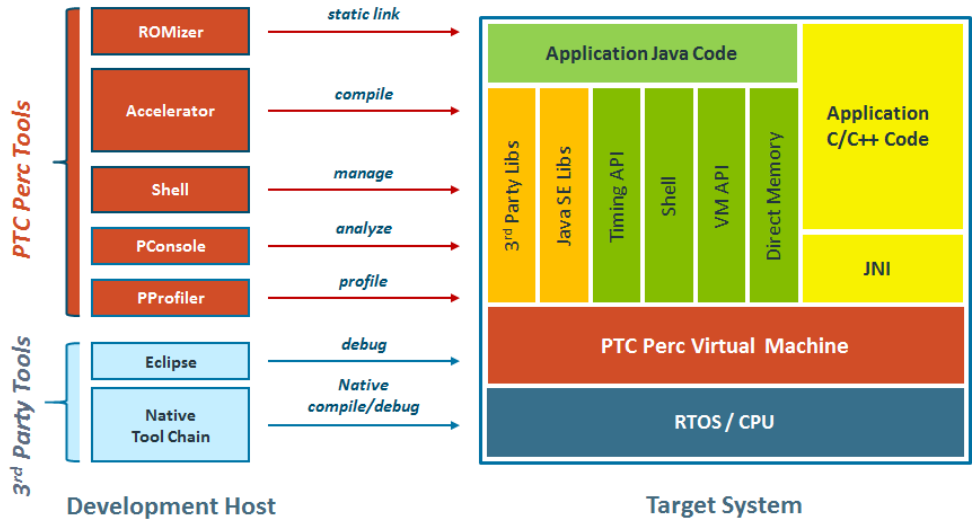
PTC PERC PRODUCT UPDATE

June 2018

THE REAL-TIME SOLUTION FOR JAVA APPLICATIONS

PTC Perc - The Embedded/Real-Time, Deterministic Virtual Machine

- ✓ Patented, Deterministic Garbage Collection Technology
- ✓ Java Standard Edition Compatible
- ✓ Symmetrical Multi-Processor Support
- ✓ Ahead-Of-Time (AOT), Just-In-Time (JIT), and Interpreted Compilation
- ✓ Eclipse-based Tool Chain
- ✓ Broad embedded target OS/RTOS Coverage
- ✓ Reduces Time and Cost of Development
- ✓ Guarantees System Availability



ptc perc®

PTC PERC VERSUS JAVA STANDARD EDITION

ptc

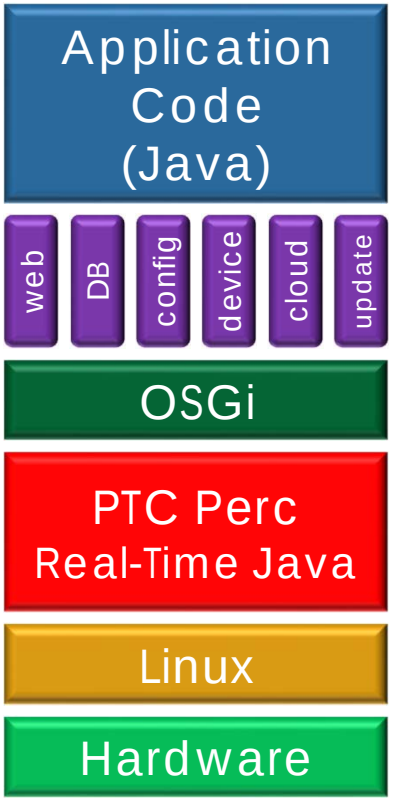
ptc perc® - the obvious choice

- ✓ For IoT Gateways
- ✓ For Edge Devices
- ✓ When application code security is important
- ✓ When long-lived, trusted execution is required
- ✓ When real-time, deterministic behavior is critical to application success

Feature	Java SE	PTC Perc
Just-in-Time (JIT) Compiler	✓ Yes	✓ Yes
Ahead-of-Time (AOT) Compiler	✗ No	✓ Yes
Real-Time Garbage Collector	✗ No	✓ Yes
Priority Inheritance Protocol	✗ No	✓ Yes
Precise Timing APIs	✗ No	✓ Yes
GC monitor and control APIs	✗ No	✓ Yes
Real-Time Scheduling	✗ No	✓ Yes
Page Locking	✗ No	✓ Yes

IOT GATEWAY SOFTWARE STACK USING PERC

- Typically runs Linux on x86 or ARM hardware
- PTC Perc provides real-time Java with sub-millisecond response
- OSGi framework provides Java software component model, over-the-air (OTA) updates, 3rd party plugin components for protocols, database, web, configuration, etc.
- Gateway-specific application code runs as an OSGi component
- Application can respond to events in real time



PERC USED IN AEGIS WARSHIP SOFTWARE UPGRADE

Software modernization project

- PTC Perc selected October, 2006 to implement improved user interfaces, new communication protocols, and new functionality in Java
- Uses Concurrent RedHawk Linux on Multi-Core x86 architecture

USS Bunker Hill (CG 52)

USS John Paul Jones (DDG 53)

"PERC Ultra Virtual Machine passes muster on modernized missile cruiser USS Bunker Hill"

- March 2010 - "The combat readiness trials assert rigorous stress on the systems they test," said Jim Sheridan, Lockheed Martin's director, Aegis U.S, Navy Programs. "We appreciate Atego's technical team's dependability, responsiveness and support during our development and testing cycle."

"USS John Paul Jones Makes History with Live Fire Missile Tests"

- June, 2014 - USS John Paul Jones successfully conducted five live-fire tests for the Baseline 9C Aegis Combat System during Combat Systems Ship's Qual. Trials (CSSQT) and Naval Integrated Fire Control Counter Air (NIFC-CA) capability

PERC CASE STUDY - SIEMENS AG

SPPA-T3000 Distributed Control System

- Improved plant availability, e.g. by predictive data analytics
- Quick reaction of the system or of the guided operator in critical situations
- Deployed in 2395 projects world wide
- "A pre-emptible garbage collector combined with a transparent prioritization of the involved threads was the convincing base for building a deterministic, robust and maintainable solution. Another decisive factor was the Ahead-Of-Time (AOT) compilation mechanism available with PTC Perc…" – *Andreas Drebinger, Siemens AG*
- Uses Real-Time Linux on x86

Lausward combined cycle power plant, Düsseldorf Germany

PERC PRODUCT RELEASE UPDATE

ptc perc® Ultra SMP

ptc perc® 64

Version 8.2

Released June 2018

- **32-bit & 64-bit Linux/Intel and Linux/ARM support**
- **Key Features / Highlights**
  - Updated OpenJDK Library (Java 8 Update 162)
  - Redesigned. faster, real-time Garbage Collector
    - Improved support for Weak, Soft, and Phantom reference types
  - OpenJFX graphics supports Java 8 UI applications
  - AOT/JIT Compiled Lambda expressions provide faster execution
- New Linux/ARM64 support for Raspberry Pi 3, Samsung ARTIK 710 IoT gateway module

PTC EXHIBIT – ADA EUROPE 2018

ptc

ptc

PTC Developer Tools

A Comprehensive Suite of Developer Tools for the Serious Engineer

- Have Questions?
- Need more information?
- **Stop by the PTC exhibit for additional information on these PTC Developer Tools products!**

ptc® apexada™

ptc® objectada®

ptc perc®

ptc