ANSYS ACT (Application Customization Toolkit)
Einführung und anwendungsnahe Beispiele

Dr. Kerstin Wielage-Burchard
ANSYS Germany GmbH
Vision: Simulation Driven Product Development

- Concept
- Collaborate
- Simulation-Driven Product Development
  - Prototype
  - Simulate
  - Analyze
  - Optimize
- Detailed Design
- Physical Prototype
- Production

Flowchart:
- Concept → Design → Physical Prototype → Testing → Analysis → Production
- Yes/No decision point for Production
Simulation Driven Product Design

All of this and much more... without any customization!
Why – Automation & Customization

• Increasing automation level
  – Time and expenses reduction
  – Minimize risks of errors

• Simple and easy way to connect with other third-party software tools in use:
  – Commonly used programs
  – In-house developed software

• Make the technology available to a wider group (non CAE experts)

• Integration of rules and guidelines

• Make sure that consistent processes exist in the company
Application Customization Toolkit

Introduction
Examples
Installation + Development
Summary
Application Customization Suite =

Application Customization Toolkit (ACT)
- Toolkit for application-level customization
- Specific to ANSYS Mechanical, DX, DM, Meshing, Wizards (within WB and standalone applications)
- ANSYS GUI
- Specialist programmer skills are NOT required

Workbench Software Development Kit (SDK)
- Toolkit for Framework integration
- System appears in the Toolbox on the WB project page
- Third-party application GUI
- Specialist programmer skills required

Your Application

ELECTRO MAGNETICS
STRUCTURAL MECHANICS
CFX
FLUENT

Application Integration
- Scripting
- Parameterization
- Framework Toolkit
- Data and Process Management
ACT – DesignModeler

Extra Toolbar Buttons added by ACT
ACT – DM: Insert Customized Buttons

“Invert Selected Bodies” button:

“Goto Lower Topology” button:
What is ACT?

• The ANSYS customization solution to develop Apps for customer-specific requirements.
• Integrate custom solvers
• Extend ANSYS products
• Automates simulation process
• Streamline fragmented workflow
From general purpose ... to customer specific

Apps deliver customer-specific solutions

• Manage workflow
• Capture expertise
• Add new features within Workbench
• Integrate in-house applications

Quickly deploy easy-to-use Apps within a unified environment
ACT-based Wizards
ACT-based wizards within applications

Electronical Desktop

SpaceClaim

Fluent
Fundamental capabilities of ACT

• Feature creation
  – New and novel BCs, Loads, Results, ...

• Integration of third-party applications
  – Embed your solver or tool into ANSYS Workbench

• Process Automation
  – Defined workflows
  – ACT-based Wizards
    • At the schematic level or integrated within applications
    • Automate multiple applications at once
  – New automation API
Application Customization Toolkit

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BGA-Geometry Creation ACT in DM

• BGA Packages are surface mounted packages for Integrated circuits

• Modeling BGA Package requires various inputs like no of balls, pitch, TSV info etc..

• Modeling BGA Package is tedious due to following reasons
  - Lot of variations in Input data
  - Input information is available in ASCII format for vias, so manual creation is not feasible
  - Designers who understand only Electronics language and not familiar with CAD package cannot manage easily

• ACT extension is created to model BGA package with all desired inputs

• ACT extension reduces modeling time and increases productivity

Figure: [http://en.wikipedia.org/wiki/Via_(electronics)](http://en.wikipedia.org/wiki/Via_(electronics))

Different types of vias:
BGA Wizard Workflow in Workbench

Click BGA Extension in DM

BGA Object Gets Created in Tree

Generate Package

ACT Overview Video

Customer Portal

Fill Details View

Read file for via import

Details View
MATLAB optimizers in DesignXplorer

Using the MATLAB Optimizers Extension for DesignXplorer (17.0 Release)
ACT for DesignXplorer

External Optimizer hosted in DX

Specific settings of the proprietary optimizers presented as for any other standard DX method

Proprietary/External optimizer accessible in DX, as an additional optimization method
Transient One-Way FSI

Enhanced by ACT

- Clear GUI solution
- Highly automated
- Easy handling
Transient CHT Simulation

Thermography, measured Data

Transient CHT Simulation

CHT = Conjugated Heat Transfer
Fluent Wizard – Blood Vessels Flow Analysis
Some more apps ...

- **Iterative Meshing 17.0**
  - Version: 170.2.1
  - Target Application: Meshing
  - Allow to perform multiple trials in mesh generation and auto-select the best mesh from those

- **CAD To Post 17.0**
  - Version: 170.1
  - Target Application: Project Schematic
  - Allow Workbench users to easily import CAD into the CFDPPost application

- **Custom Update 17.0**
  - Version: 170.2.2
  - Target Application: Project Schematic
  - Facilitate to automatically export various data during the “Update” process for a Component/System/Project and Design Point

- **Acoustics 17.0**
  - Version: 170.1
  - Target Application: Mechanical
  - Expose 3D acoustics solver capabilities

- **Mixing Guided Process Template 17.0**
  - Version: 170.1
  - Target Application: Wizard
  - Provide easy-to-use and automated workflow for creating mixing tank geometry, running single phase (flow blend and exposure analysis) simulations and generating comprehensive mixing report

- **Honeycomb Creator 17.0**
  - Version: 1.0
  - Target Application: DesignModeler
  - Easily create honeycomb core models from a few simple cell properties and bulk size specifications.
  - [Contains source code]
Customer Portal: ANSYS ACT “Application Store”

- Free and paid apps
- Ever expanding offering of applications
- Developed by ANSYS and third-parties
- Several ANSYS ACT videos
- Template Extensions and Training material available
- Full training videos

Accept the NSLA to download an app
- Non-Standard License Agreement
Application Customization Toolkit

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In general,

- The creation of **scripted** extensions require a license
- The installation of **binary** extensions typically does not require a license.
ACT Components

Module used by “super users” to develop extensions

• Used to create ACT-based customizations or “extensions”
• License managed
• Maintained and supported by ANSYS

Files given to users to access the enhanced functionality

• Then becomes visible to the end-user in the GUI
• Created extension under binary format (no license)
• No special license required to run the extensions (beyond the one to run ANSYS applications)
• Outside of ANSYS’s standard support model
ACT Start Page

- Provides consistent launching point for extensions and wizards
- Direct access to ACT console
- ACT start page is the first step in creating an IDE for App creation

Green – App is loaded.
This ACT tool is
• installed along with the Workbench
• provides an interactive environment to help the ACT developers

This ACT tool enables you to
• Find out suitable commands for your extension
  – Tooltips and auto-completion
• Test code pieces even before developing an extension
• Debug developed extensions
Application Customization Toolkit

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ACT – Summary

- ACT is the unique tool for the customization of all ANSYS applications
- ACT enables to meet application specific and multi-physics needs
  - Automate process with application specific customized interfaces
  - Add new pre-, post-features
  - Integrate external applications into Workbench
  - Offers both third-party and ANSYS product connections
- ACT offers Ease of use and Consistency
  - Customize all products with ONE consistent approach: same logic, same UI, same syntax (Python and XML)
  - APIs are documented and forward compatible
- ACT apps make complex simulations accessible to non-expert simulation users
ANSYS products that currently support ACT’s customization capabilities – R17.0

<table>
<thead>
<tr>
<th>Product</th>
<th>Simulation Workflow Integration</th>
<th>Feature Creation</th>
<th>Process Compression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workbench</td>
<td>✓</td>
<td>✓</td>
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<tr>
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<tr>
<td>Electronics Desktop</td>
<td></td>
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<tr>
<td>Fluent (Beta)</td>
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<td>Fluent Meshing (Beta)</td>
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