Maya Programming Introduction

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Session Agenda

- Why use Programming

- Overview of Maya Languages

- Uses for Python in Maya

- Help Documentation

- Navigating the Installation Folder

- Looking at how the documentation works

- How to execute Python in Maya

- Logging Bugs and Suggestion Features

- Available Resources

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Let's Get Started

Welcome to Autodesk Maya 2013
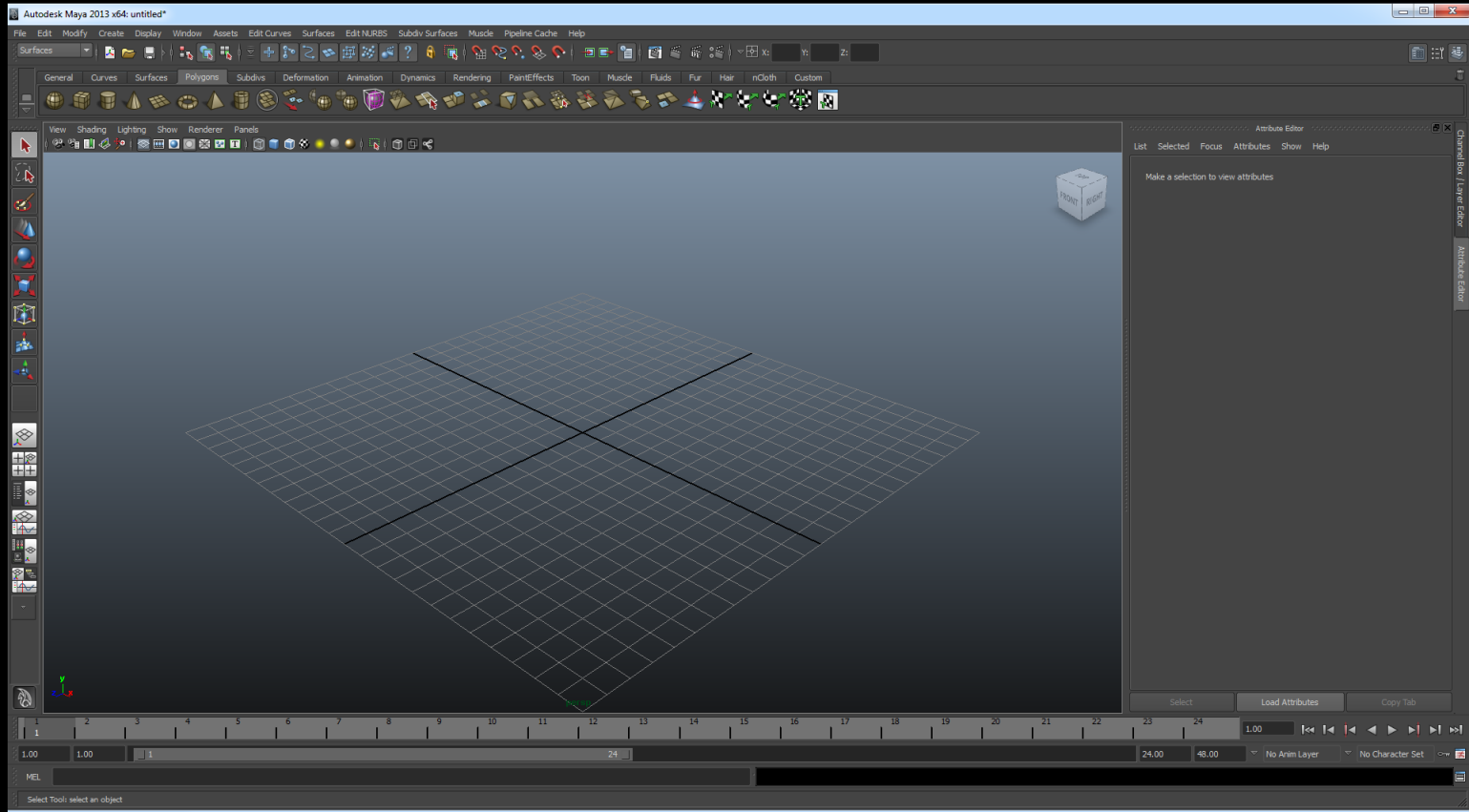
Why use Programming in Maya

- Automate repetitive, time-consuming tasks and extend features

- Uses popular, easy-to-use Python scripting language

- The C++ and Python API to create custom tools and features that plug directly into Maya

- Create project-specific functionality, for specific workflows and requirements.

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Overview of Maya Languages

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Programming In Maya Possibilities

Available programming language options in Maya:

1. Maya Embedded Language (MEL)
2. C++
3. Python scripting

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MEL Scripting

- MEL (Maya Embedded Language) is a scripting language at the heart of Maya.

- Maya's user interface is created using MEL, and MEL provides an easy way to extend the functionality of Maya.

- Everything you can do using Maya's graphical interface can be automated and extended using MEL.

- Familiarity with MEL can deepen your understanding of and expertise with Maya.

Python Scripting & API

- Python is a powerful and popular object-oriented scripting language.

- With the introduction of Python into Maya 8.5, we now provide Python support for calling the Maya commands.

- In addition, we support the Maya Python API which allows developers to write Maya plug-ins and stand-alone applications without having to learn C++.

- This integration of Python in Maya empowers production facilities to better integrate Autodesk Maya into your production pipeline.

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Maya C++ API

- The Maya API increases Maya's power, customizing and extending Maya in many ways that you never thought possible.

- It provides functionality for querying and changing the Maya model along with the ability to add new Maya objects to the Maya model.

- You can use the Maya API to implement two types of code resources: plug-ins which extends the functionality of Maya, and standalones such as console applications which can access and manipulate a Maya model.

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How they fit in Maya

SCRIPTING CHOICES Overlapping Functionality

API CHOICES

Maya Command Docs

1. MEL Scripting

1. C++ API

API Class Docs*

Python Command Docs

2. Python Scripting

2. Python API

Maya Application

*This is changing soon

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Advantages of Scripting

- Easier learning curve

- No resources needed to start developing, such as Visual Studio

- Quick prototyping for tools

- Platform Independent

- Tons of free modules (Python)

- Easily move between API and Scripting capabilities in Maya all with in the same plug-in or script (Python)

Advantages of C++ API

- Compiled, no source code discloser

- Can be 10+ faster than Python

- More classes and function exposed

- More detailed manipulation of lower level core

- More devkit samples and resources

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Why Python?

- Customers Requested

- Object Oriented

- Open Source

- Mostly Interpreted no Compiler Needed

- Used for Both Standalone programs and Scripting Applications

Advantages

- Quicker Development Cycle

- Extremely Portable

- No need to recompile code every release

Disadvantages

- Slower than a fully compiled language like C++

- Discloser

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Others who use Python

Other Autodesk Products:

- MotionBuilder: real-time animation product.

- Showcase: Real-time viz product.

- FBX: Autodesk File Format

- Wiretap: access to media managed on Autodesk® Stone® file systems without the need to convert files or copy media across the network

Non-Autodesk:

- Youtube, Google, NASA and Air Canada's reservation management system.

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Distinguishing features of Python

- White space defines scope

  - Class methods defined within class definition

- Python objects are references/pointers

  - Garbage collection

- Namespaces

Usages for Python in Maya

1. **Maya Python scripts:**
   - access standard "Maya commands" from Python
   - like MEL scripts written in Python

2. **Maya Python API Scripts**
   - write scripts that access functionality previously available only through the C++ API
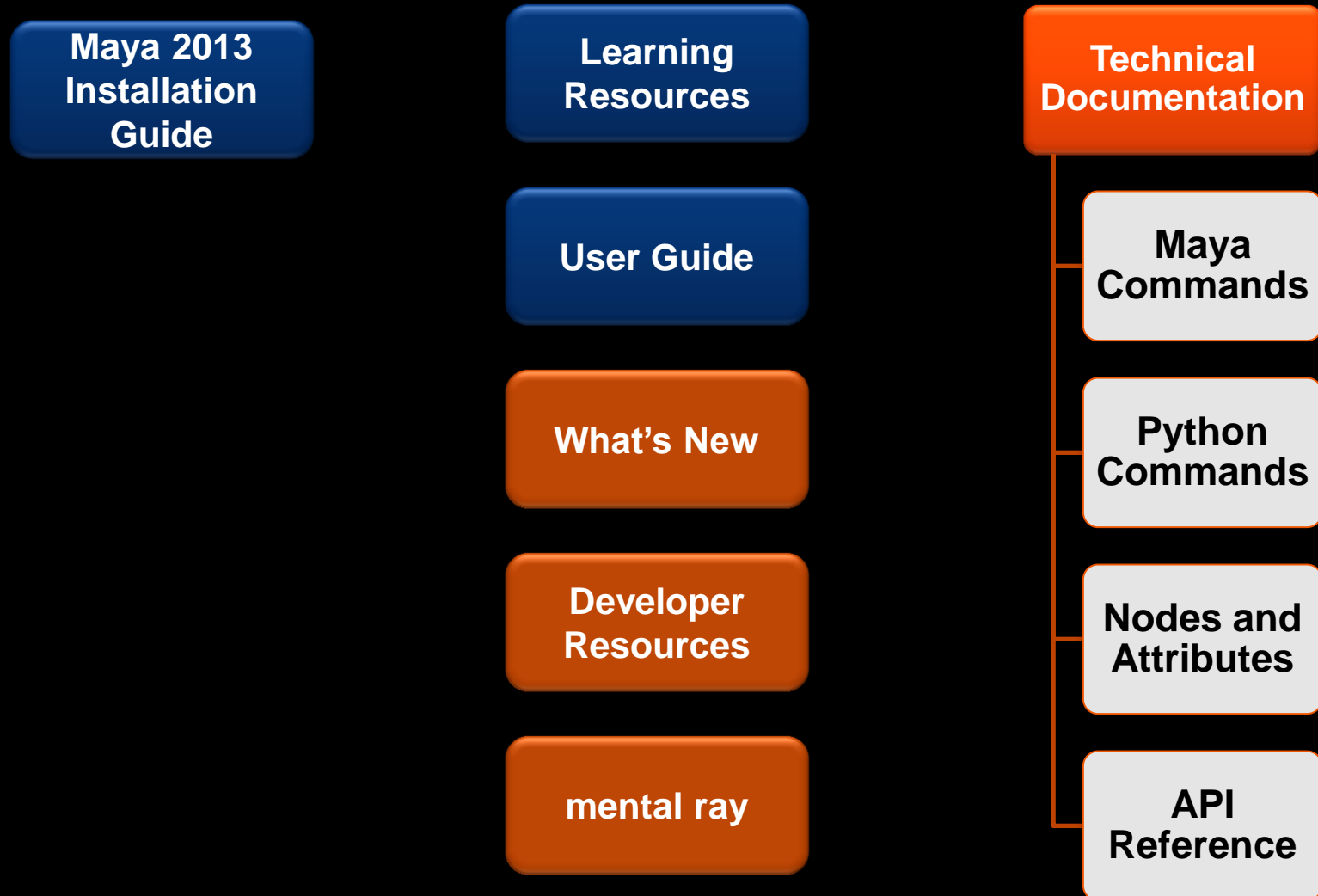
3. **Maya Python API Scripted Plug-ins**
   - define new commands, nodes, etc using Python
   - like C++ plug-ins written in Python

4. **Maya Python Standalone Apps**
   - like MLibrary-based C++ applications, but written in Python
   - Non UI

Documentation Structure

Maya 2013 Installation Guide

Learning Resources

User Guide

What's New

Developer Resources

mental ray

Technical Documentation

Maya Commands

Python Commands

Nodes and Attributes

API Reference

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Help Documentation

API Docs are only available on the web:

- www.autodesk.com/maya
  - under 'Documentation' link, download or view

- www.autodesk.com/developMaya

- http://usa.autodesk.com/adsk/servlet/item?id=16707768&siteID=123112
  - 2013 SDK Link

Navigating the Installation Folder
with respect to programming

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Navigating Maya Install Folders

- Default installation locations:

  C:\Program Files\Autodesk\Maya2013

  C:\My Documents\maya\2013-x64

- 6 Key Programming Related Folders:
  - bin (mayapy.exe)
  - devkit
  - include
  - lib
  - mentalray
  - Python
  - scripts

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Specific Example Locations

C++ Plug-in Examples:

- C:\Program Files\Autodesk\Maya2013\devkit\plug-ins

C++ Standalone Application Examples:

- C:\Program Files\Autodesk\Maya2013\devkit\applications

Python Examples:

- C:\Program Files\Autodesk\Maya2013\devkit\plug-ins\scripted
- C:\Program Files\Autodesk\Maya2013\devkit\applications\scripted

How to Execute Python in Maya

How to Execute Python

1. Script Editor

2. Shelf

3. Command Line

4. Plug-in Manager

5. Python modules of Maya from a standalone Python interpreter

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Helpful Coding Standards

1. Comment your code, so that you and others can clearly read it

2. Put introduction comments at the top of your code, so the code is informative.

3. Name your variables appropriately, so it is again clear to read.

4. Use spaces, it makes easier to read

Let us know!

Let us know about Maya defects or Wish list items:

- Log software defects here:
  - www.autodesk.com/maya-bugreport

- Log software wish list items here:
  - www.autodesk.com/maya-sug

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Book Resources

- Python
  - Learning Python (O'Reilly) by Mark Lutz and David Ascher

- C++
  - Thinking in C++ Volume One: Introduction to Standard C++ by Bruce Eckel

- Python Scripting and Python API
  - Maya Python for Games and Film: A Complete Reference for Maya Python and the Maya Python API by Adam Mechtley and Ryan Trowbridge

- MEL Scripting and C++ API
  - Complete Maya Programming, Volume 1 by David A. D. Gould

Additional Maya API Resources

- Maya Developer Center
  - http://www.autodesk.com/developmaya
    - Maya API White Paper's
    - DevTV (video)
- Questions and Problems: ADN
  - http://www.autodesk.com/adn
- The AREA || 3D Community Forums (API & MEL)

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