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## CERTIFICATION TOPICS

### 1. Overview of 3D and C4D

- General
- Preferences
- Understanding Licensing and installation process
- C4D Version awareness
- Preferences Overview

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### 2. Project Settings Managers

- Object Manager
  - Attributes Manager
    - Basic Tab and Object Manager Relationship
- Material Manager
- Coordinates Manager
- Layer Manager

### 3. Command Palettes

- The main C4D interface has 2 main tool/Command Palettes, Horizontal on the top and Vertical in the left side of the interface. You should know what each command/tools does.

### 4. Viewport – 3D View and Orthographic Views – Viewport Menus

- View
- Cameras
- Display Modes
- Grids
- Filter
- Panel
- Configure... Viewports in Attributes Manager
  - HUD
  - Background Reference images

### 5. Viewport Navigation

- Viewport
  - Navigation Shortcuts
  - Viewport Framing Shortcuts
  - Default Camera Settings

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### 6. Layouts – Interface Customization – Custom Layouts

- Using Preset Layouts
  - Creating Custom Layout
- Save / Load Custom Layout
- Customize Commands
  - Customize Existing Palettes
    - Creating and Saving Custom Palettes
- Customize shortcuts
- Commander – SHIFT – C

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### 7. Object Manager

- Hierarchies
  - Local (Object) – Global (World) Coordinate Systems
  - Coordinates Manager
  - Coordinate Manager Dropdown menus
    - Obj (Rel)
    - Obj (Abs)
    - World
    - Scale
    - Size
    - Size+
- Attribute Manager Coordinates
  - Differences and Similarities between Coordinate Manager and Coord. In Attribute Manager.
    - Attribute Manager - Coordinates - Live
      - Rotation order – H/RB Rotation, Rotation Order and Gimbal Lock
        - Quaternions
        - Freeze Transformation
        - Coordinate Manager - Need to apply or press Enter
        - Attribute Manager - Coordinates - Live
          - As Sibling under a Parent Object
    - What happens when a parent has non normalized Scaling (not 1,1,1 in the Scaling in the AM)
- Object Naming in Object manager
  - How to organize your scene using meaningful names for Objects
  - Manual Naming
    - Naming Tool
- Null Object - Groups
- Object manager Helpers - Filters
  - Search tool
  - Path Bar
  - Hierarchical Level
  - Filters

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### 8. Transform Tools

- Move
- Rotate
- Scale
  - Difference between Model Mode & Object Mode with Scaling
- Axis' Locks
- Axis Gizmo
  - Move
  - Scale
  - Rotate
- Quantizing

### 9. Object Manager Layers

- Overview
- Add Subtract
- Layer Channels
  - Solo, Visible in Editor, Visible in Render, Visible in Object Manager, Locked, Animation, Generators, Deformers, Expressions, Xrefs

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### 10. Content Browser

- Using
- Creating Assets for Content Browser
- Sharing CB Assets

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### 11. Modeling

- Primitives
  - Where are they in the UI
  - What are Primitives and how they compare to similar objects in other software
    - Why can't we Scale Primitives non uniformly with the Scale Tool in Model Mode?
- Deformers
  - Where are they in the UI
  - What can we expect from Deformers
    - As Child
    - As Sibling under a Parent Object
  - How does the Order in the GM affect Order of execution
  - How can we use Fields with Deformers
- Modeling & Object Generators
  - Extrude
  - Lathe
  - Sweep
  - Loft
  - Boolean Object
  - Connect Object
  - Symmetry Object
  - Instance Object
  - Polygon Reduction Generator
- Splines
  - Primitive
  - Importing Splines from other software
  - Editing – Manipulation
    - Knowledge of all Spline Editing Tools
  - Spline Attributes
    - Type
      - Open - Closed
      - Intermediate Points
    - Spline Mask
    - Spline Under Connect Object
- Volume Modeling
  - What are Volumes?
  - Volume Modeling
  - Using fields with volumes I
  - Creating motion graphics workflows with VDB
  - Using Volumes with fields II
  - VDB Overview I
  - General Understanding of Volumes (VDBs) in the industry
  - VDB Overview II
  - Volume Builder: SDF Mode
    - What data can they contain
    - What we use them for
- Polygon Modeling
  - Components
    - Points
    - Edges
    - Polygons
    - Component Attributes
      - Weights (Vertex)
      - Selections (Polygon - Edge - Point)
      - Normals
    - Phong Tag
      - What does it do?
      - What are Edge Breaks?
    - Basic Understanding of "Topology"
      - Triangles
      - Quads
      - N-Gons
        - Complex Poles
        - Topological Flow
        - Why we need Retopology (examples)
    - Mesh Tools for Modeling (Mesh Menu)
    - Good Understanding of all Mesh Editing Tools
    - Component Selections & Selection Patterns (Loops, Rings, Fills e.t.c.)
    - Component Modeling Axis
      - Move Scale & Rotate Tools Attributes
      - Modeling Axis Tab
      - Object Axis Tab
      - Soft Selection Tab
    - Snapping (General Snapping Checking)
    - Sub
      - Coplanar
        - Non-Manifold (and how to resolve)
        - Complex Poles
        - Triangles, Quads & N-Gons
        - Z-fighting
      - Subdivision Surface Modeling
    - What is Texture - Sculpt Baking
      - Bake Object
      - Bake Material
    - Sculpting (Overview)
      - Sculpting for adding Texture Detail using Baking
      - Sculpt Menu
      - Baking Sculpt Objects

### 12. UVs

- What are UVs?
- UV Tile
- Overview of the UV Unwrapping Process
  - Cuts - Seams
  - Pins
  - Unwrapping - Relaxing
  - Packing
  - UV Islands
  - Projections
- UDIMS (U-Dimension) Overview
  - UDIM Workflow
  - The importance of UDIMS
  - UDIM UV Mapping

### 13. Lighting – Environments

- Understanding CG Lights and Lighting
  - Light Components
  - Diffuse
  - Specular
  - Shadows
    - Falloff
    - Inclusions / exclusions
    - Visibility - Volumetric
  - Light Types
    - Omni
    - Spot
    - Area
    - Infinite
    - Dome Light Setup
  - Lighting Setups
    - Indirect Illumination techniques
      - Reflectance
      - Fake GI (Light Domes) [alt: Global Lighting using Light Domes]

### 14. Taken – Scene Iterations (Overview)

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### 15. Cameras

- Understanding CG Cameras
- Camera types
- Camera Attributes
- Camera Rigs that imitate Dollies, Cranes e.t.c.
- Camera Effects
- Depth of Field
- Motion Blur
- Lens Effects
  - Camera Composition Helpers (Camera Object - Composition)

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### 16. Stage Object (Multi Camera)

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### 17. Materials – Textures

- Understanding Material fundamentals
  - What does a Material applied to an Object Consist of
    - Material
    - Channels
    - Type
  - Material Tag
  - Understanding Projections
    - Projection Types (Geometric UVs - Spherical, Cylindrical e.t.c.)
    - Material Frontal Projections
    - Material Coordinates (Material Tag Attributes)
    - UV/Texture Coordinates
    - Using PSR to place Materials (Texture mode)
- Material Channels
  - Color (Albedo)
  - Diffusion
  - Luminance
  - Transparency
  - Reflectance - PBR
  - Bump
  - Normal
  - Displacement and Sub Polygon Displacement
  - Alpha
  - Viewport Settings for Materials
- PBR Materials
  - Nested Diagnostics - How to create Proper "Liquid in Glass" renders
- Textures (loaded bitmaps used to define the properties or data of a material channel)
- Shaders
  - Noise
  - Gradient
  - Fresnel
  - Colorizer
  - Filter
  - Layer
  - Ambient Occlusion
  - Luminas (or Light Node in Nodal Materials or Lambertian in Arnold)
- Standard understanding of Shader flow
  - Standard material (Layered approach)
  - Nodal materials
    - Overall Nodal Material Constructio
    - Renderer Specific Differences
    - Subsurface Scattering
  - HDR Images & Panoramas
    - What is an HDR
    - Color Bit Depth
    - 8, 16 & 32 bit images
    - HDR Formats
  - What is a Panorama (360, 180 e.t.c.)
  - How do HDRs and Panoramas Correlate
  - How to make HDR images and Panoramas (Bracketing, Stitching e.t.c.)

### 18. 3D Painting – General Understanding - BodyPaint Quick Setup Reference

- What is 3D Painting?
- When to use 3D Painting
- Combining UVs - sculpting - baking and 3D Painting

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### 19. Rendering

- Render Settings
- Render Region (IRR)
- Viewport Render for Preview and Animatics
- Animatic
- Final
- Output to File - File Formats
- Multipasses - AOVs
- Render Tags
  - Compositing Tag
  - External Compositing
- Picture Viewer

### 20. Integration with Compositing Pipeline

- AE integration
  - Exporting Sequences
  - Exporting 3D Data
  - Understanding the Correlation between C4D (3D) and AE (2.5D)
- Cineware

### 21. Project Asset Inspector

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### 22. Rendering Technologies

- Scanline / Ray Tracing Hybrid – Standard
- Ray Tracing - Physical
- Path Tracing
- Biased - Unbiased rendering
- Global Illumination
  - Cache
  - Brute Force
- CPU - GPU Renderers
  - Advantages - Disadvantages
  - Workflow Differences

### 23. Rendering Things That Are Not Meshes

- Particles
- Volumetric Effects
- Atmospheric
- Participating Medium
- Sketch and Toon
- Using Hair Rendering (Hair & Splines)
- Faking Rendering Effects in post

### 24. Rendering Multipasses and Arbitrary Output Variables (AOVS)

- Passes Overview
- Object - Material Buffers
- z-Depth
- Motion Vectors

### 25. Industry Standards for Images

- Naming
- Formats (encoding)
- Frame Rates
- Color Profiles (General understanding)

### 26. Render Farms and Render Management Software (Overview)

- Setting Up Team-Render Overview
- Render Queue Overview

### 27. Animation

- Keyframes
  - Creating
    - Automatic
    - Manual
  - Timelines - Keyframe interpolation
  - F-Curves
  - Animation Tracks
    - Attributes
    - Looping
    - Repeating
- Point Level Animation
  - What it is
  - What type of objects can have PLA
  - Limitations
- Camera Animation Techniques
  - Framing
  - Cinematic
  - Secondary Effects (Handheld Camera Shake)
- Object Animation
- Parameter Animation
- Procedural Animation (Concept of Animating without Keyframes)

### 28. Placing CG Objects in Live Footage (Overview)

- Light Estimation
- Camera Matching - Calibrator

### 29. Camera Tracking (General Overview)

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### 30. Rigging Tools (Not Character Rigging)

- Smart Hierarchy construction
  - Nails
  - Splines or Nulls (as Controllers)
  - Tags
  - IK Tag
  - Target Tag
  - Align to spline
  - Constraints
  - Vibrate
- Basic IK Hierarchy
  - Inverse Kinematics VS Forward Kinematics (IK vs FK)
  - Using IK Tag on Object Hierarchies or Joint Hierarchies
  - Setup
  - Goals
  - Pole Vector
  - Binding
- Joints - What they are and How can we use them

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### 31. XPRESSO Overview

- Set Driver – Set Driven
- What is XPRESSO
- XPRESSO interface
  - How to add objects to XPRESSO
  - How to create inputs and outputs by dragging Attributes

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### 32. MoGraph

- MoGraph Generators
  - What are MoGraph Generators
  - What each MoGraph Generator Does
    - Cloner
    - Matrix
    - Fracture
    - Voronoi Fracture
    - Voronoi Fracture
    - Voronoi Fracture
    - Motistance
    - Motet
    - Tracer
    - MoSpline
- MoGraph Modifiers
  - MoExtrude
  - PolyFX
- MoGraph Clones (also called MoGraph Nodes or MoGraph Particles)
  - What parameters does a Generated MoGraph Clone inherit from the Cloner?
    - ID
    - Color (RGB-A)
    - World Coordinates
    - Weight
    - Matrix (Position - Scale - Rotation)
    - Time Offset (only Keyframes)
    - Visibility
    - Blending amount (between Blending clones)
      - Blend geometry
      - Blend Parameters
    - Which instance is the Clone
  - Clone iteration
  - Clone Blending
  - Clone Keyframe Animation Modes
    - Play
    - Loop
    - Fixed
    - Fixed Loop
  - Effects
    - Fields
    - MoGraph Tags
    - MoGraph Shaders
    - Instance Modes Differences – Advantages and Limitations
- Effects
  - Applied to MoGraph Generators
    - Function
    - Parameters
    - As Deformers
      - Component Coordinate system
  - Field
    - Cinema 4D Fields: Introduction
    - Walking Through Fields: Triggering Animation: Series Overview
    - Using Fields with Volumes I
    - Entering the fields
    - Fields are essential for the Strength of MoGraph Effects
    - Concept of 3D Masks
    - Normalized vs Arbitrary Values
    - Clamps, Remapping and Data Wrangling
    - Blending Modes
    - Field Groups
      - Where can we use Fields
        - Effectors Falloff
        - Deformers Falloff
          - Volumes
          - MoGraph Selections
          - MoGraph Weights
          - Component Selections
          - Vertex Maps
          - Normal Maps
      - XPRESSO
      - Particle Modifiers Falloff
      - Field Force
    - Tracer Object
    - MoSpline
    - Poly FX

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### 33. Simulations

- Dynamics
  - Rigid Bodies Overview
  - Soft Body Overview
- Particle Systems
  - Standard Overview
  - Thinking Particles Overview
  - Third Party (know of them)
- Hair Overview
- Cloth Overview
- Caching Geometry
  - Cloth cache tool
  - Dynamics Body tag
  - Alembic
  - Point Cache
  - MoGraph Cache
  - Jiggie

### 34. Exporting Scenes and Assets for 3rd Party Software Overview

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### 35. Cineware Exchange Overview

- Know what 3rd party Software Cineware works with Overview
- After Effects
- Adobe Illustrator
- Unity
- Unreal

### 36. Using Hair Materials Overview

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### 37. Cinema 4D Resources Overview

- Cineware
  - Tools
  - Plugins
- Maxon Labs (temporarily)
- Third Party Content

### 38. Third Party Assets

- HDRI Haven
- GrabCAD
- Nasa3D
- Mcomaster.com
- textures.com
- Mixamo.com
- nasa3d.arc.nasa.gov/models
- e.t.c.

### 39. General 3D References (Links)

- Cineversity
- Cineware Youtube Channel
- Maxon Youtube Channel
- Pixar in a box
- GonitCG Youtube Channel
- Practical Guide to Path Tracing