Project 1: Procedurally Modeling a Building

Ba'hai Faith Temple | User Guide & Breakdown

Rendering Statistics

Renderer	Mantra	
Average Render Time	17.5 minutes	7.5 min
Image Resolution	1280 x 720	1024 x 576
Number of Lights	5 (Sun+Sky, 3 Fill Area Lights, 1 Line Backlight)	

Sampling

Noise Value	0.01	0.01
Min Rays	3	3
Max Rays	9	9
Global Quality	2	1
Diffuse Quality	2	1
Diffuse Limit	1	1

Geometry Complexity

Points	2863
Primitives	1950
Vertices	9342
Polys	1950

CONTROLS

Massing

Number of Faces	Controls the number of faces of each level of the building mass.
Radius	Radius of the total building mass, affects each level
Inner Radius	Affects the eccentricity of the bulge inward or outward
Rotation Angle	Controls the initial rotation of the building

Levels

Ground-to-Second Step Increment	Ratio of the radius of the second level to the radius of the first level, as a percentage. Used to manipulate the width of the second level.
Second-to-Third Step Increment	Ratio of the radius of the third level to the radius of the first level, as a percentage. Used to manipulate the width of the third level and the dome.
Ground Level Height	Floor-to-floor height of the ground level
Second Level Height	Floor-to-floor height of the second level
Third Level Height	Floor-to-eave height of the third level

Apertures

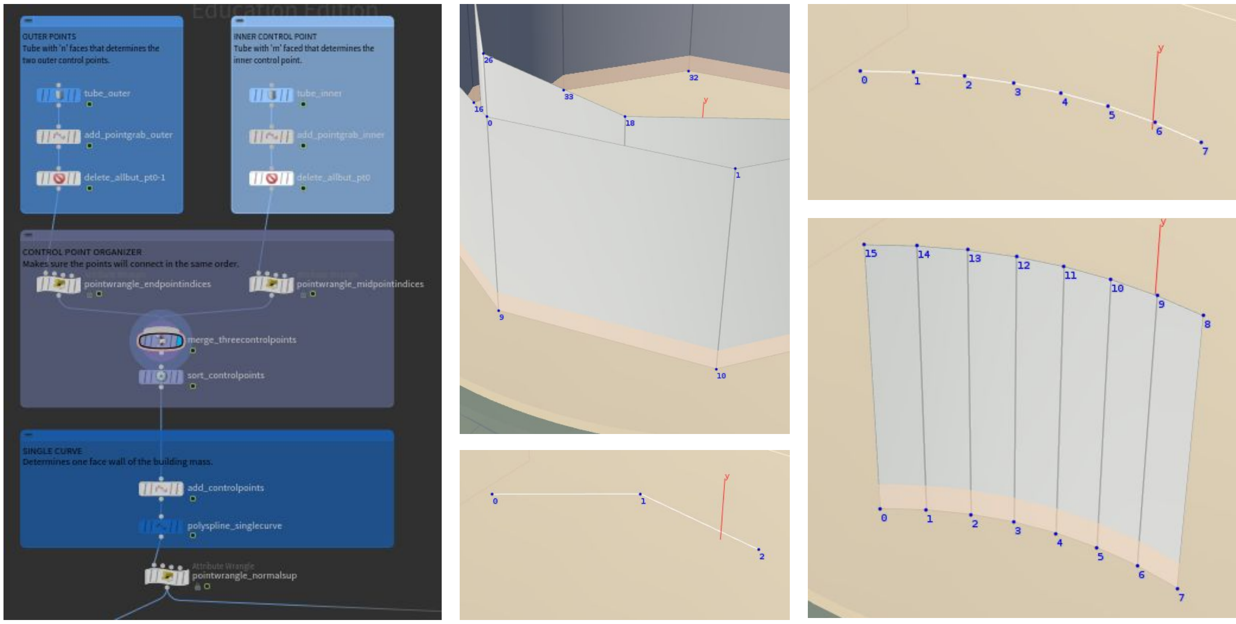
# of Divisions, Third Level	Number of divisions on the third level. Determines the number of windows and other features on the walls.
# of Divisions, Ground and Second Level	Number of division on the ground and second level. Determines the number of windows and other features on the walls.
Third Level Window Height	Height of the windows on the third level as percentages of the normalized height of the wall. Fixed to the centroid point of the wall face.
Ground and Second Level Window Height	Height of the windows on the ground and second levels as a percentage of the normalized height of the wall. Bottom edge is fixed to the floor plane of that level.
Window Width	Width of the windows.

Columns

Column Height	Column height, as a percentage of the normalized height of the wall.
Capital Height	Capital height, as a percentage of the normalized height of the column
Dome Rib Thickness	Thickness of the dome ribs

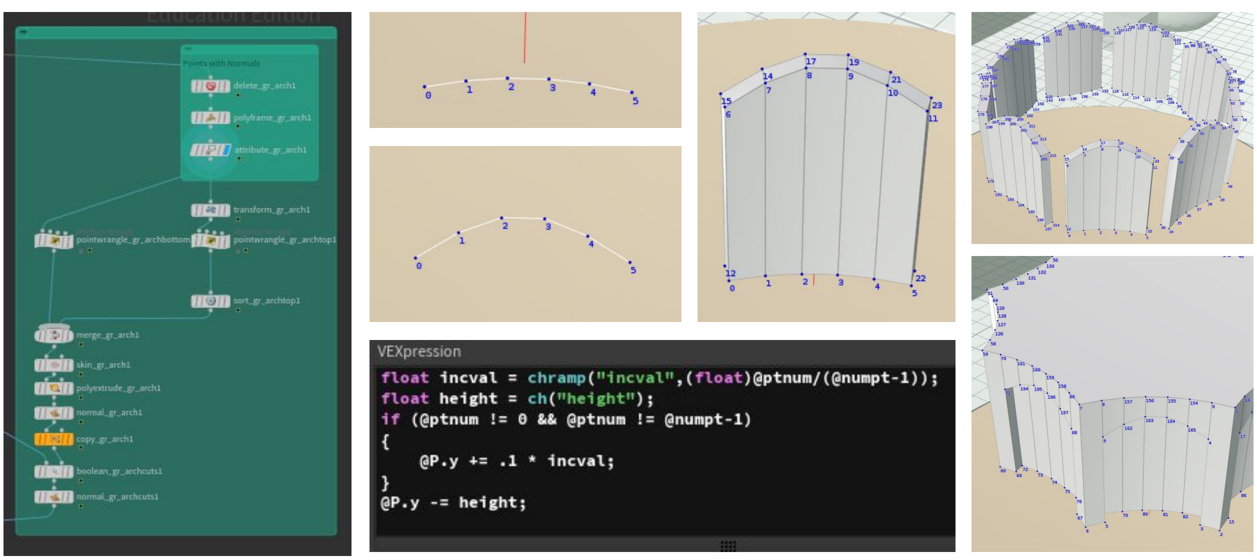
CHALLENGES & TECHNIQUES

01 | Building a curved wall for a radial building.



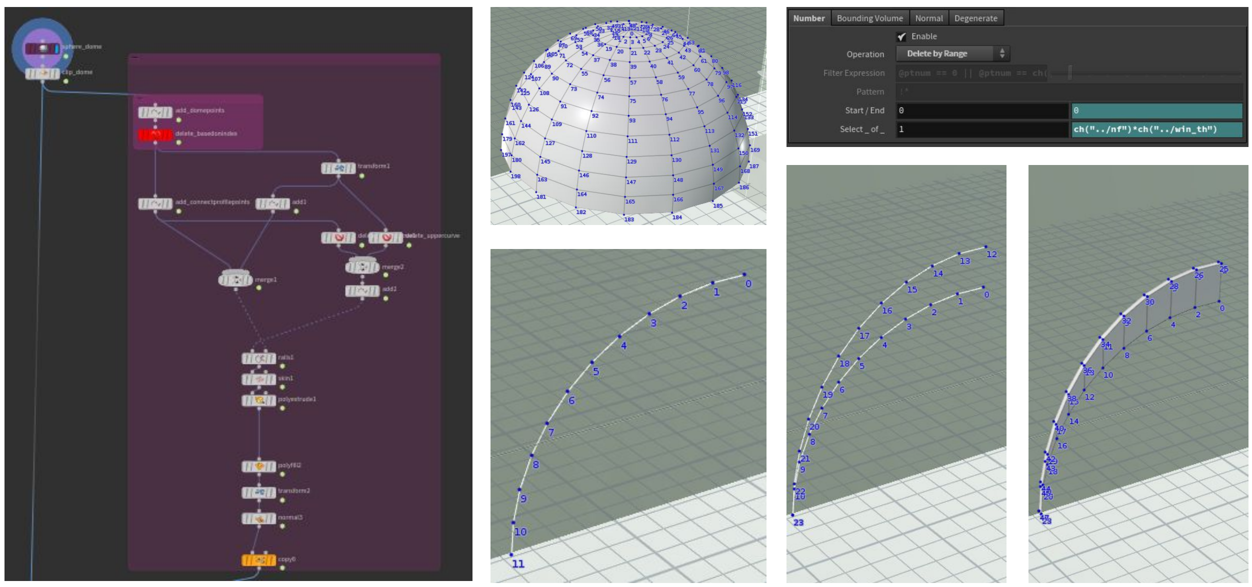
To create the one curved wall face for the radial building, two tubes were used, one for the midpoint and one for the endpoints. These were used to create the control points for a curve created by a Polyspline node. This curve was copied and a Polyskin node was used to create one wall. Solution developed by Professor Deborah Fowler.

02 | Cutting in an arched alcove.



The initial curve is taken, and two of the endpoints are deleted. The above VEXpression is used to manipulate the Y-values based on a ramp. The curve manipulated into an arch and the initial curve with the culled endpoints are used to generate a surface through Polyskin, then extruded. This shape is rotated, and a Boolean Subtract node is used to cut into the initial building mass. VEXPression developed by Professor Deborah Fowler.

03 | Extracting a Profile to create the Dome Ribs



A Clip node is used at the same height as the sphere to create a dome. From the points of the dome, points are grabbed based on the number of columns on the sphere. This curved is stretched, then skinned and extruded along with the original curve.

BEYOND THE REQUIREMENTS

There were significant challenges to this building compared to a , with a heavy emphasis on carrying normals in this radially symmetrical building. Additional challenges including mapping feature equidistantly on curved walls, extracting a profile from a dome, and arching an existing curve to create a volume to boolean into the building mass.