

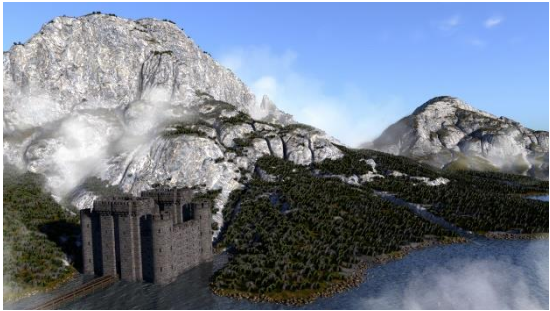
Procedural Castle

User Guide & Breakdown

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Tool: Houdini

Final File: Procedural_Castle_v12.hipnc



Project Summary

This project demonstrates a fully procedural castle generation system created in Houdini. Inspired by the real-world Bodiam Castle in England, it allows users to control castle dimensions and architectural elements. Together with environmental generation (terrain, vegetation, rocks, etc.) through custom parameters. The entire system is designed for reusability and scalability, making it suitable for different levels, themes, or styles for game development.

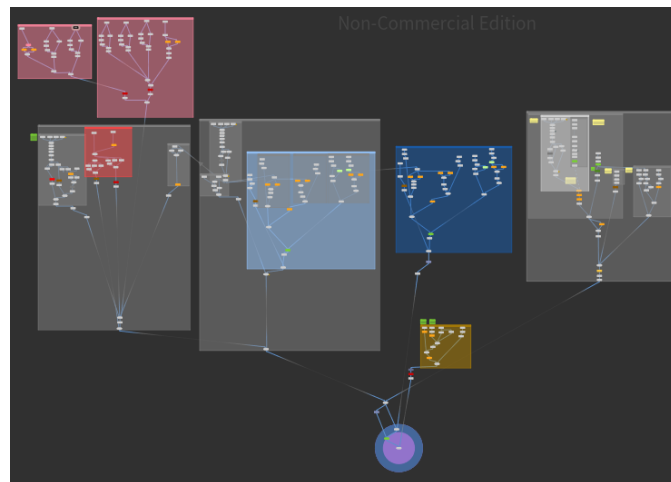
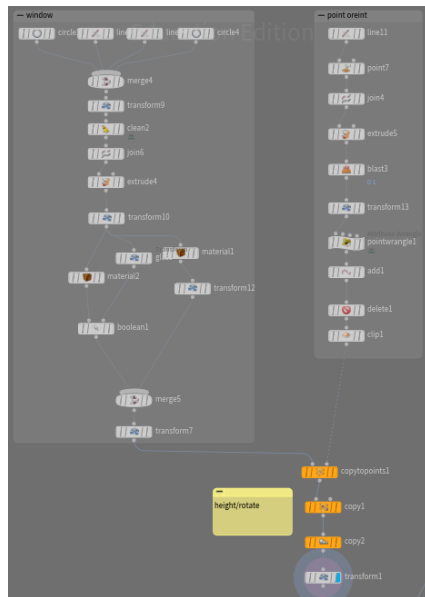
Building the Castle – Procedural System

The castle is constructed using modular components, almost every piece of the castle has its attributes procedurally connected to other parts of the castle. Each element is controlled by parameterized attributes and attribute linking expressions like the screenshots below.

Size	<code>ch("../width")</code>	4	<code>ch("../depth")</code>
Center	0	<code>ch("sizey") * 0.5</code>	0

Size	<code>ch("../swidth")</code>	20	<code>ch("../swdepth") * .2</code>
Center	0	<code>ch("sizey") * 0.5</code>	0
Rotate	0	90	0

Wall and tower dimensions are driven by user-defined parameters exposed at the top node. Positioning and spacing of elements are dynamically calculated using expressions. Window positions are generated procedurally using a copy to points workflow. Each window's orientation is handled using custom point attributes. Created via @orient quaternion attribute or normal vector alignment. A circle point array is clipped and mirrored to ensure all windows face outward consistently. (window and all castle node graph below)

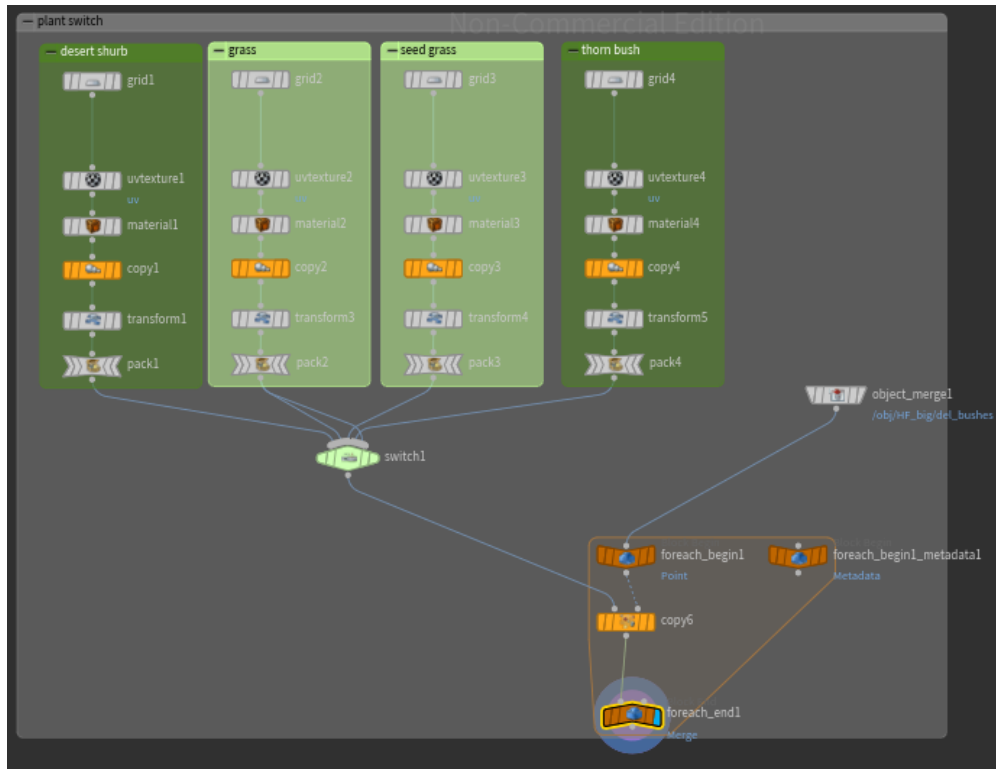


Environment Generation

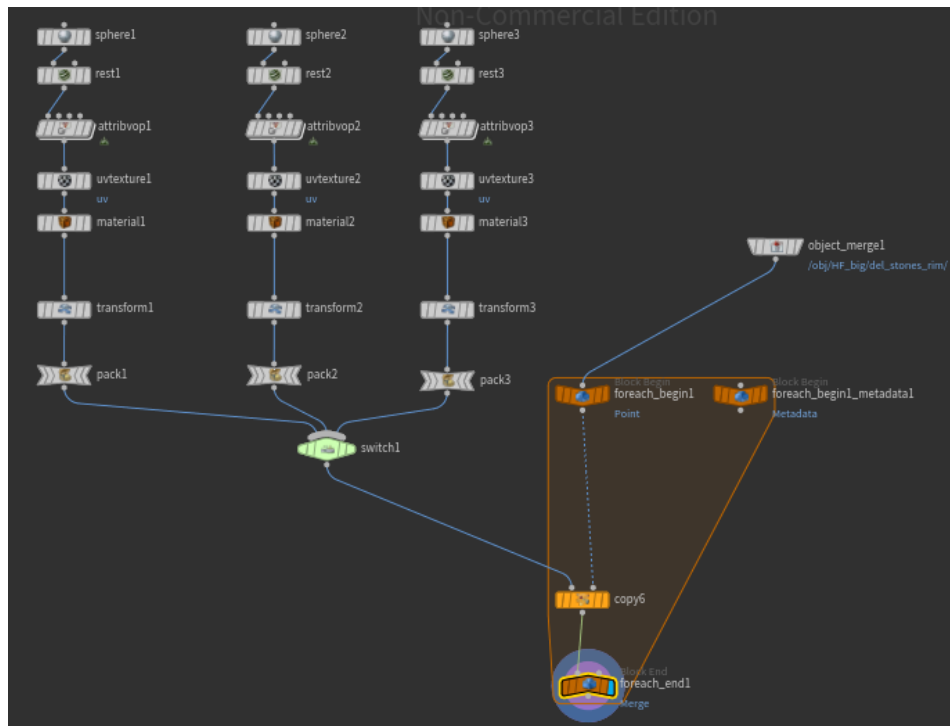
- **Heightfield Terrain**
- Built with multiple layered heightfields: base terrain + noise + distort + erosion.
- Used heightfield mask by feature to apply vegetation and erosion selectively.
- Painted custom masks using heightfield paint for localized control.



- **Vegetation: Grass & Bushes**
- Used packed geometry with copy to points to efficiently instance large vegetation sets.
- Used delete by camera frustum to optimize render/viewport performance.
- For bushes: Used 'For-Each Point' loop to randomly assign bush models.

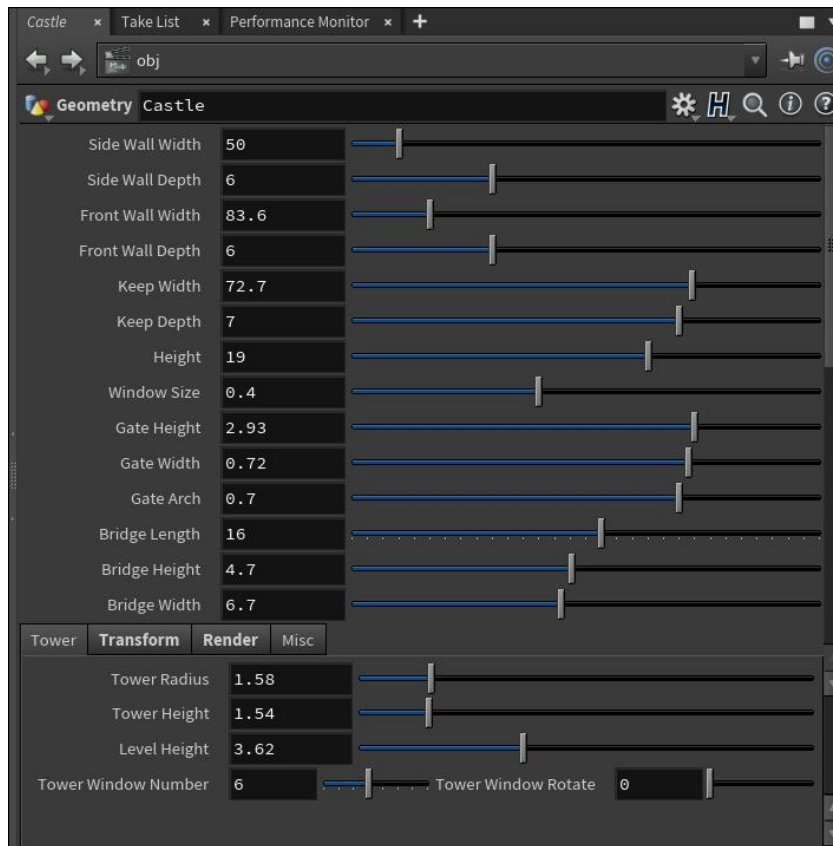


- **Procedural Rocks**
- Created from high-frequency spheres:
- mountain SOP or noise-based displacement.
- Added vdb and remeshed for stylization.
- Controlled via random seed + scale attributes.



User Guide

This tool can be used to easily build a customized castle. All crucial components are controlled via exposed parameters (in the screenshot below), enabling easy customization.



Control Parameters:

The Castle: controls for the main body of the castle, including 4 walls and 2 keeps

- **Side Wall Width:** used to modify the width of the 2 walls on each side of the castle
- **Side Wall Depth:** used to modify the depth of the 2 walls on each side of the castle
- **Front Wall Width:** used to modify the width of the 2 walls on front and back sides of the castle
- **Front Wall Depth:** used to modify the depth of the 2 walls on front and back sides of the castle
- **Keep Width:** used to modify the width of the 2 keeps on front and back sides of the castle
- **Keep Depth:** used to modify the depth of the 2 keeps on front and back sides of the castle
- **Height:** used to modify the height of the castle, including towers
- **Window Size:** used to modify the size of all the windows on the castle walls
- **Gate Height:** used to modify the height of the 4 gates on front and back sides of the castle
- **Gate Width:** used to modify the width of the 4 gates on front and back sides of the castle

- **Gate Arch:** used to modify how high the half circle arch on the top part of the 4 gates
- **Bridge Length:** used to modify the length of the bridge in front of the castle
- **Bridge Height:** used to modify the height of the bridge in front of the castle
- **Bridge Width:** used to modify the width of the bridge in front of the castle

The Tower: controls for the four towers

- **Tower Radius:** used to modify the radius of the 4 towers
- **Tower Height:** used to modify only the height of the 4 towers
- **Level Height:** used to modify the height of each level of the tower. The higher the number, the more windows a tower has vertically.
- **Window Number:** used to modify the amount of the windows of the 4 towers
- **Window Rotate:** used to rotate the windows of the 4 towers