Producing Pre-render/In-game Shared Character Asset
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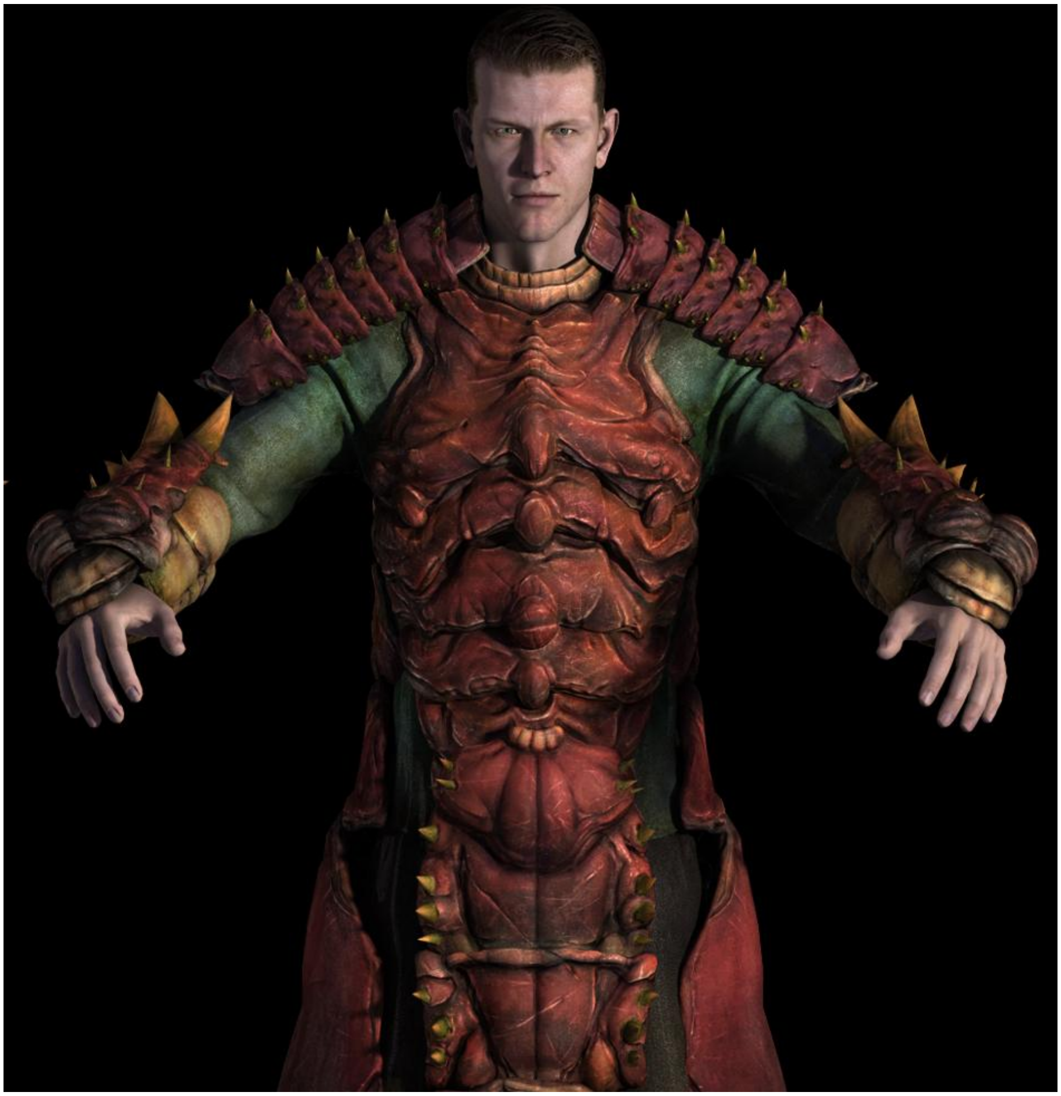
Producing Pre-render/In-game Shared Character Asset

Sharing an asset between pre-render and in-game characters is a challenge. This class will demonstrate the process of building a high-resolution pre-render character and converting it to a game resolution asset. The class will focus on generating a stylized realistic human character for games and demonstrate geometry reduction, UV transfer and generating maps.



Post process of character creation before content.

- Idea
- Design/thinking
- Color palette
- Finalizing

Modeling Character

- Process/design (Medium resolution)
- Modeling the armor
- Smoothing and cosmetic details
- Modeling the head
- Modeling the cloth

UV

- Unwrap UV’s on medium resolution mesh

Texturing Process

- Brief texture painting
- Projection painting

Modeling Game Resolution Character

- Geometry reduction to fit the game constrains
- UV transfer from high resolution to game resolution
- Texture transfer

Rendering

- Software rendering
- Hardware rendering

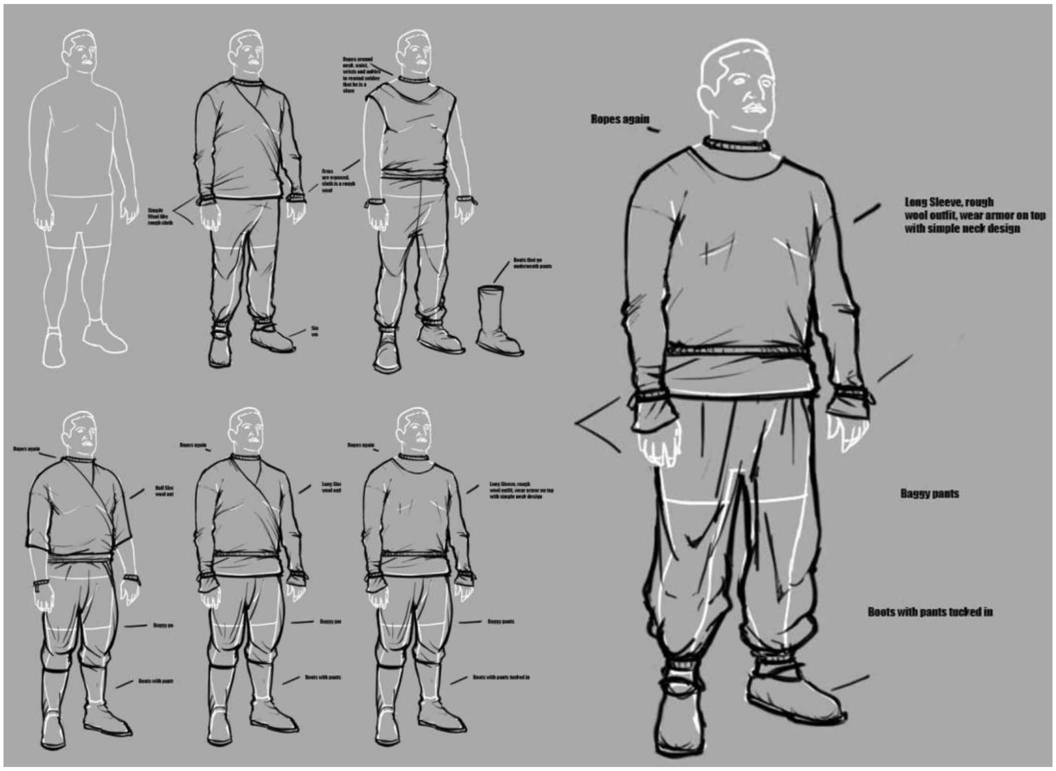
Post process of character creation before content.

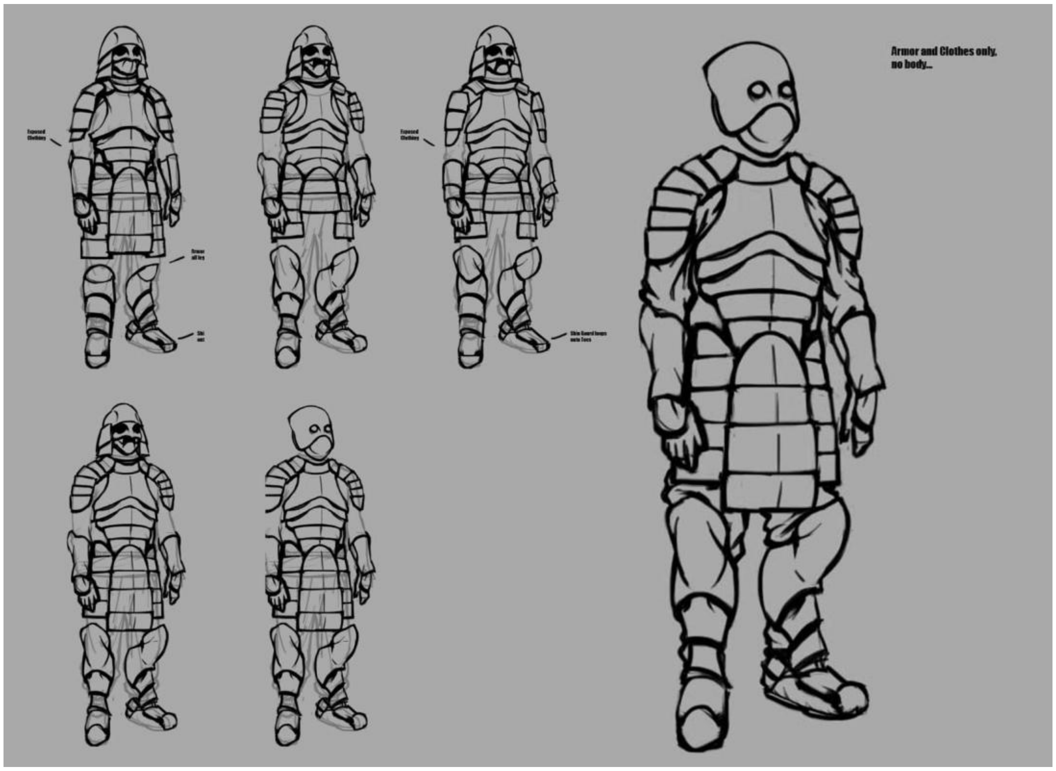
Idea

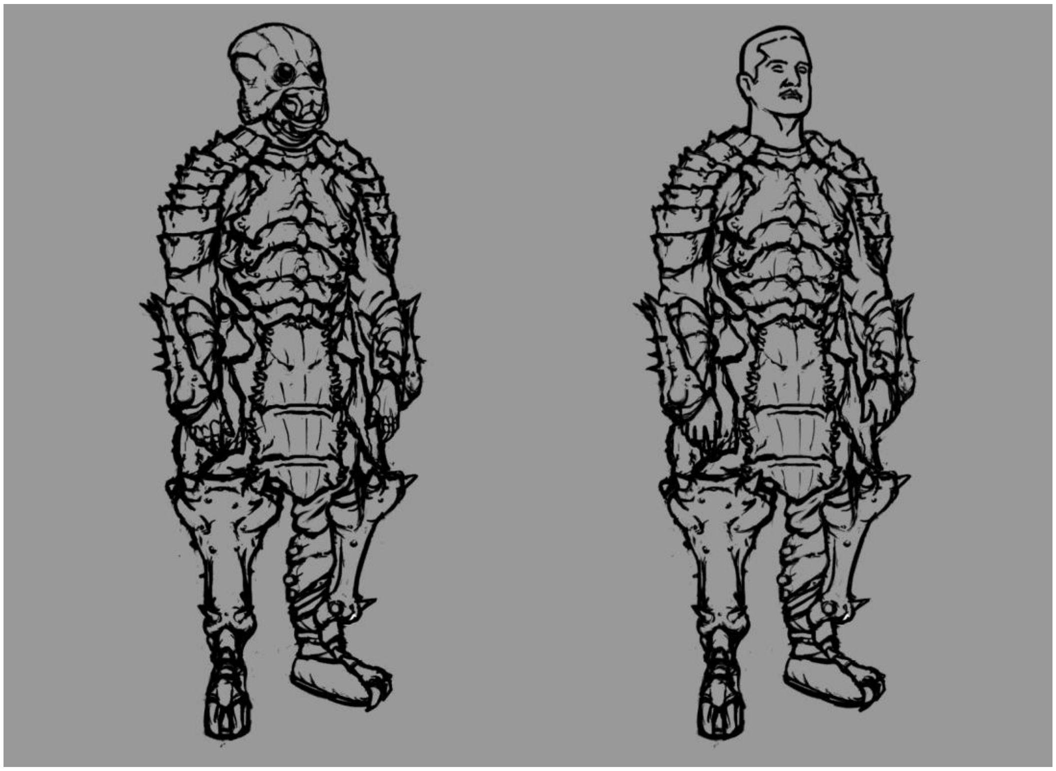
- A slave warrior character who wears large insect exoskeleton as armor.

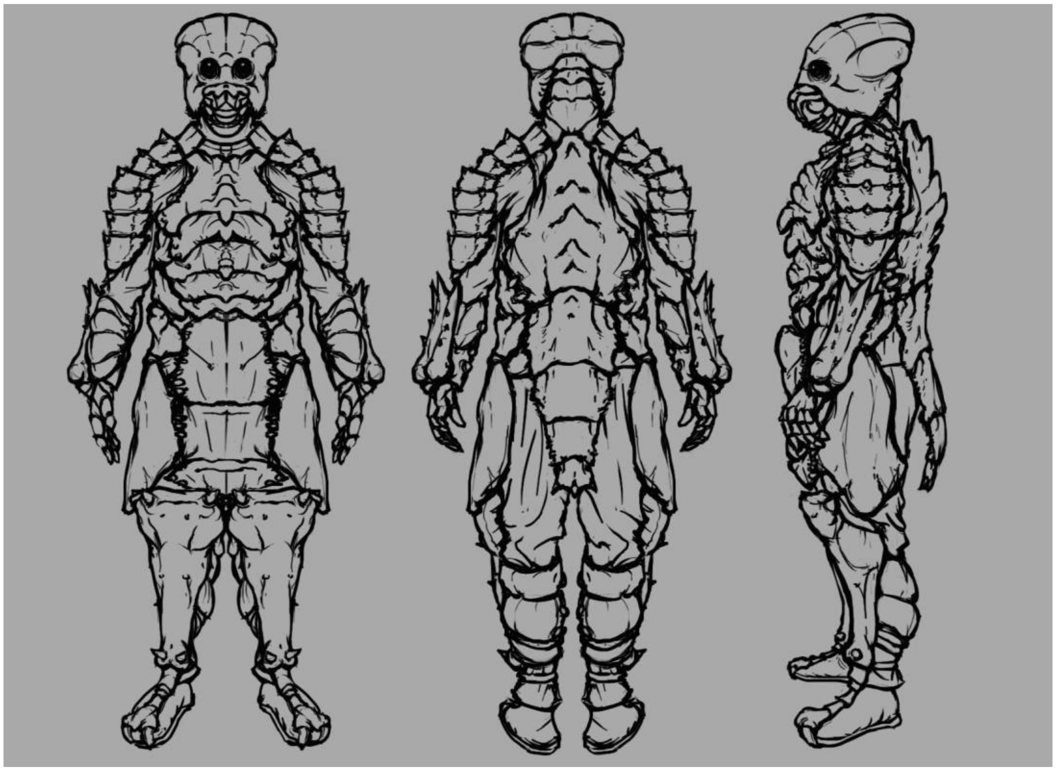
Design/thinking

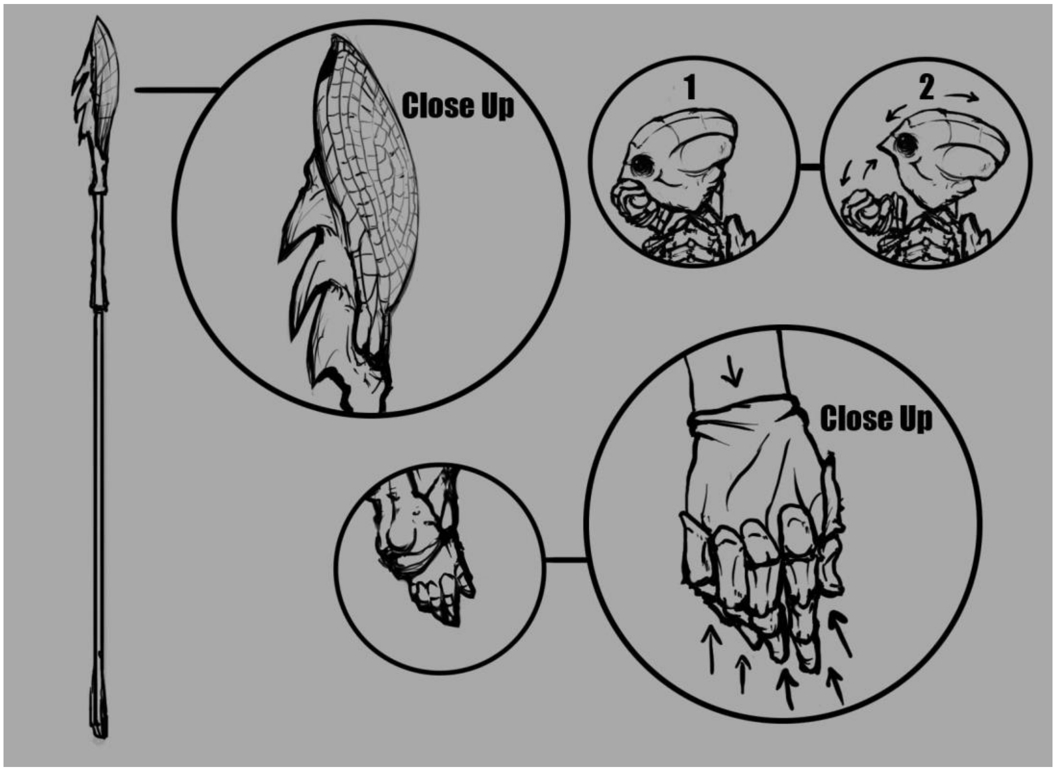
- Designing a fantasy character that is visually compelling.
- Making sure what is designed follows the original idea Shinichiro envisioned, while balancing function and form.
- Using reference and making sure there enough information in the concepts for a modeler and texture artist to complete.
  - Orthographic views
  - Preliminary sketches
  - Close-ups

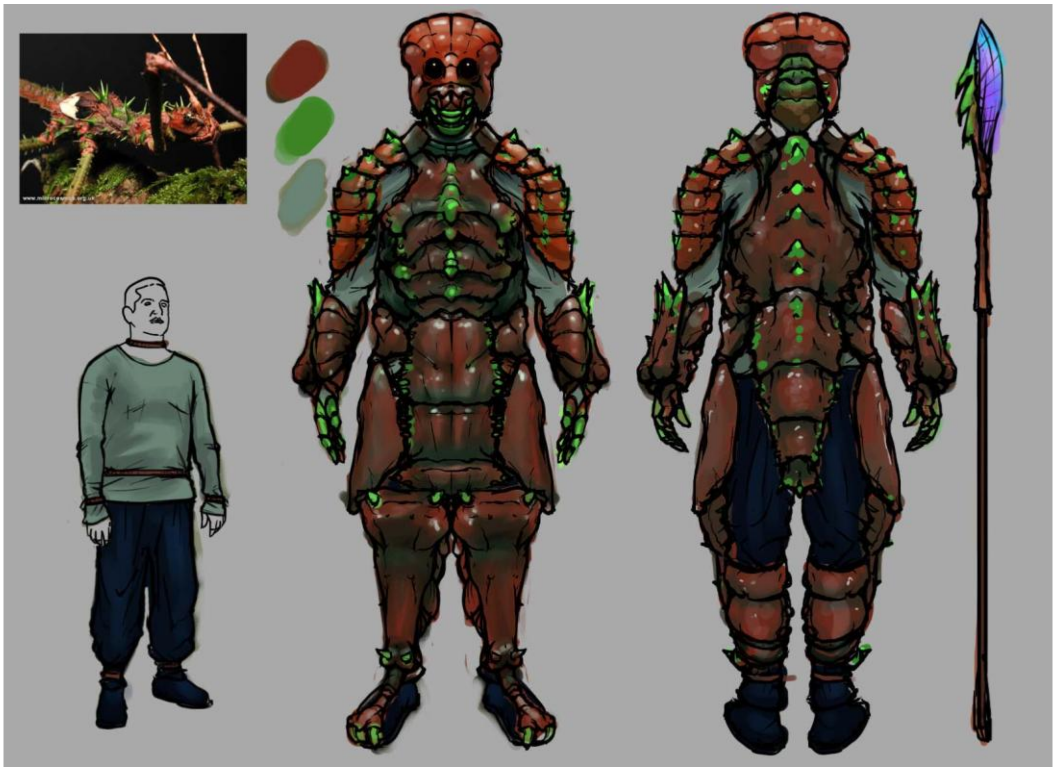

Ropes around neck, waist, wrists and ankles to remind soldier that he is a slave
Simple Wool like rough cloth
Arms are exposed, cloth is a rough wool
Sle ve
Boots that go underneath pants
Ropes again
Half Slee wool out
Baggy pa
Boots with pants
Ropes again
Long Slee wool out
Baggy pa
Boots with pants
Ropes again
Long Sleeve, rough wool outfit, wear armor on top with simple neck design
Baggy pants
Boots with pants tucked in
Ropes again
Long Sleeve, rough wool outfit, wear armor on top with simple neck design
Baggy pants
Boots with pants tucked in


Exposed Clothing
Armor off leg
Shi
Exposed Clothing
Shin Guard loops onto Toes
Armor and Clothes only, no body...






Close Up
1
2
Close Up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Color Palette

- Having a color palette that a texture artist can work from and follow, that defines details and tones.

Finalizing

- Gathering up all the concepts, approving it and passing a long to production.

Modeling Character

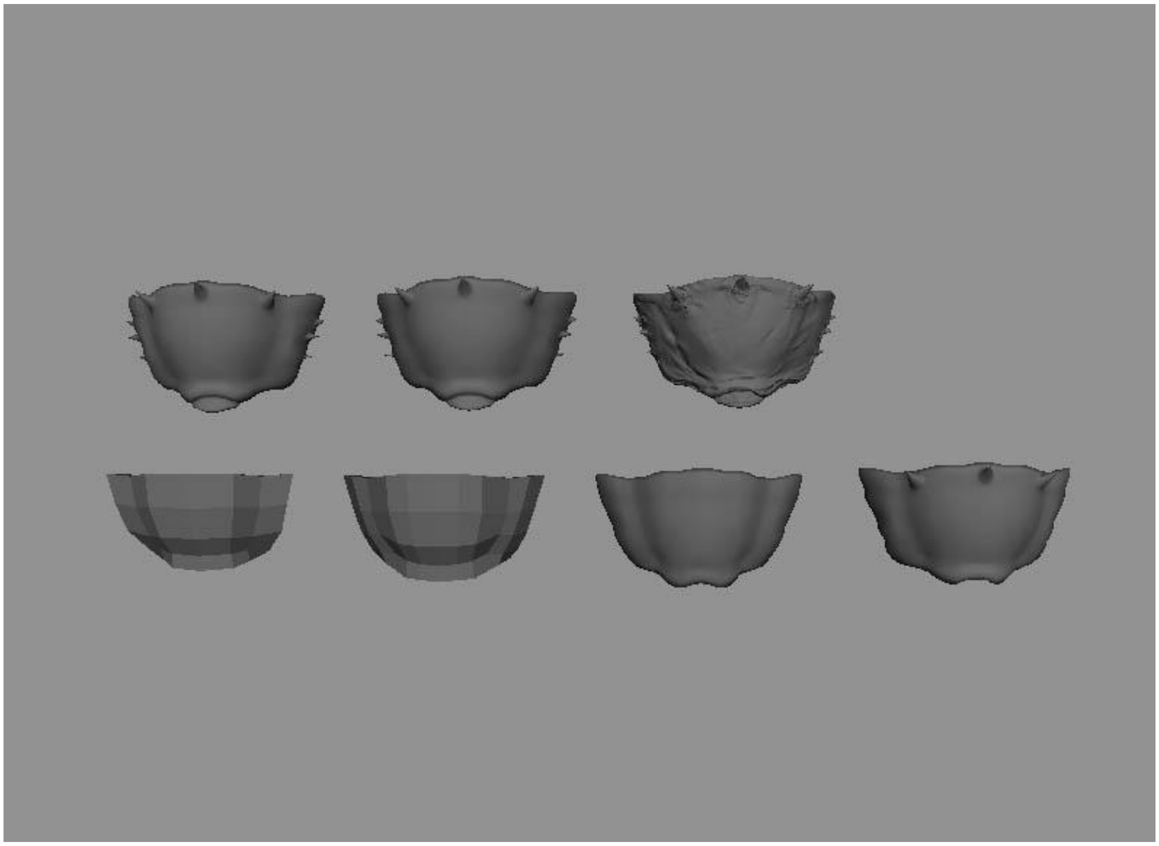
To construct Pre-render/In-game shared character asset, Medium resolution (pre-render model) is used as the base of all the character contents. The medium resolution model is somewhere around 100,000 polygons, as for the game resolution model, it is around 10,000 and high resolution model is in millions. The workflow is first constructing a medium resolution model using traditional polygonal modeling technique. The game resolution model is constructed using polygon reduction tools and traditional polygonal modeling technique for the fine tuning. The medium resolution model is exported to the high resolution polygon editing software such as Madbox to generate high resolution mesh which is used to generate the normal maps. The maps are used for Pre-render/In-game character assets for the final software rendering and real time rendering.

Process/design (Medium resolution)

- Building what you want to see.
- Creating medium resolution geometry by cutting and pulling vertices, not using subdivision or smoothing except to check surface area of geometry.
- Clean quads with little use of triangles. (except for backsides where its not seen)
- All about silhouette (asymmetrical treatment to details) and making sure it’s strong to compliment use of normal and displacement maps.
- Good foundation to work from when exporting later on into Mudbox.

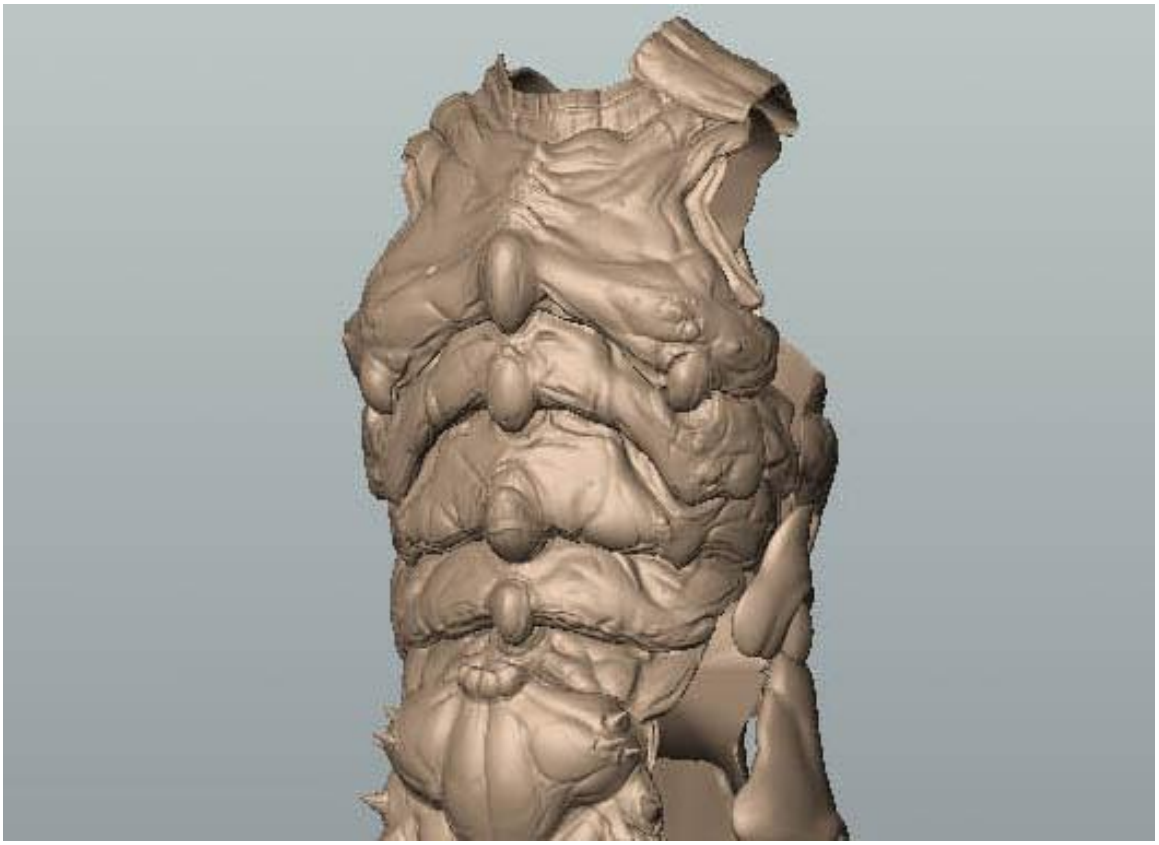
Modeling the armor (reinforce ideas with shoulder example)

- Using shoulder as geometry example.
- Showing armor geometry in general.

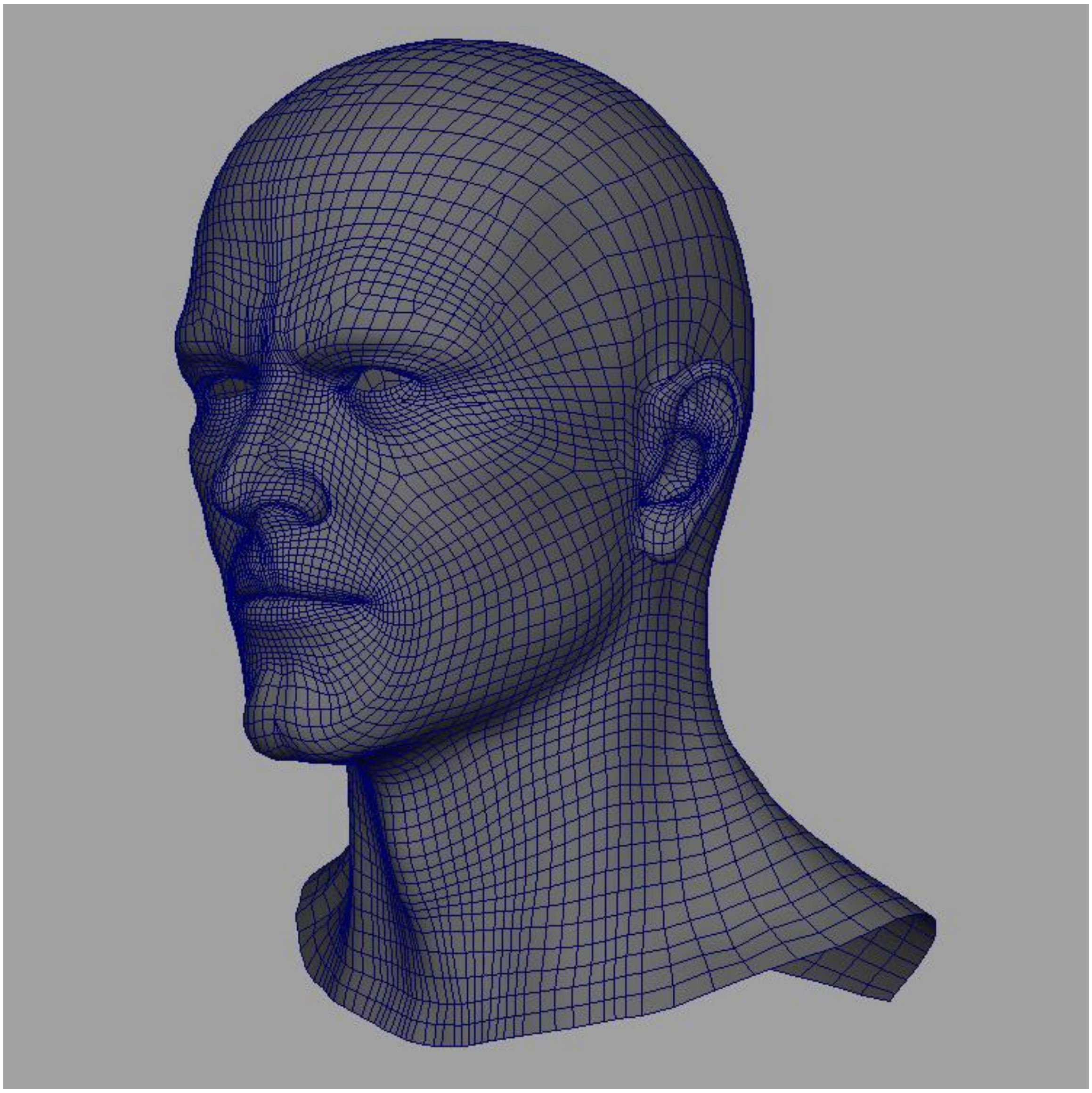


Smoothing and cosmetic details

- Smoothing is done to test out the surface of the geo and making sure fidelity of geometry holds before taking it to Mudbox for cosmetic details.
- Using Mudbox to do higher fidelity details, finer details, and to create subtle asymmetrical details, while keeping with the original foundation geometry.

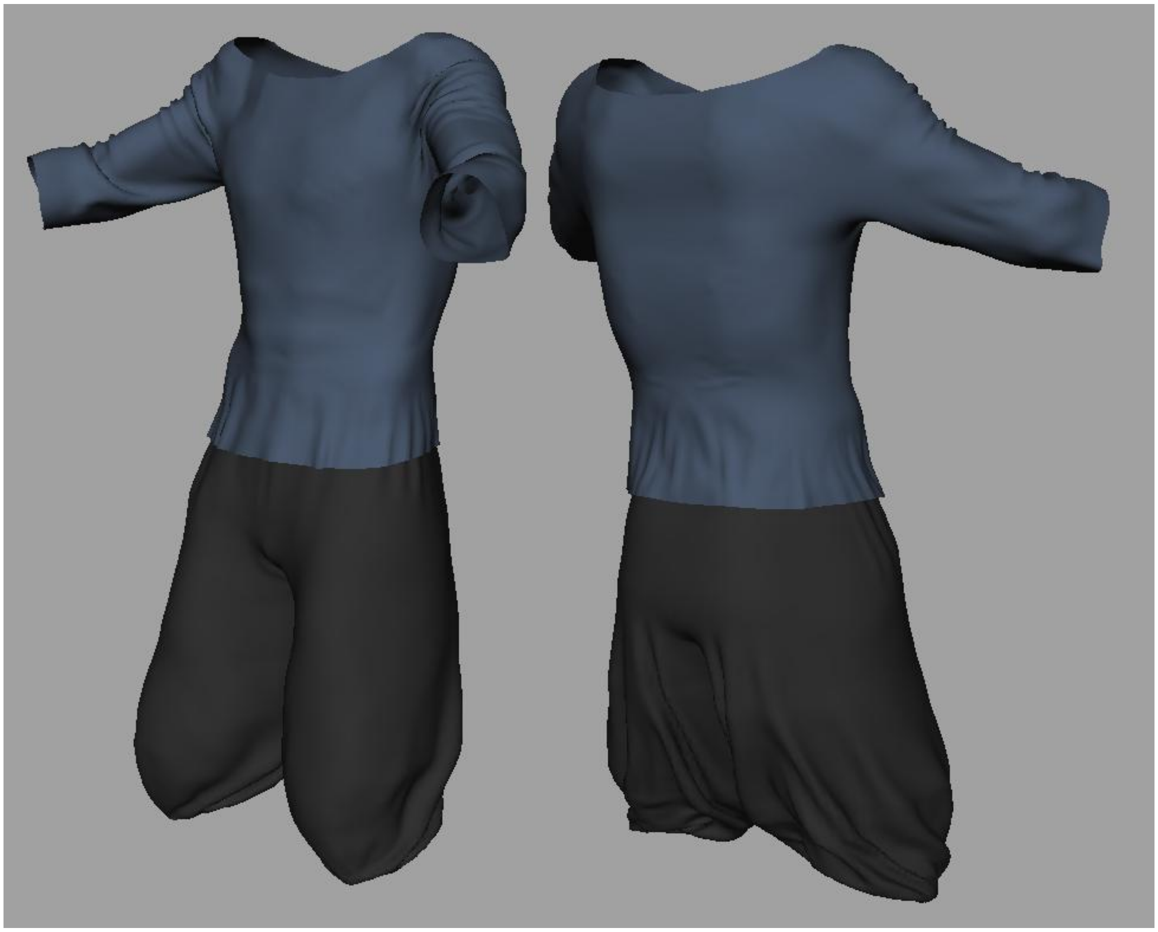


Modeling the head

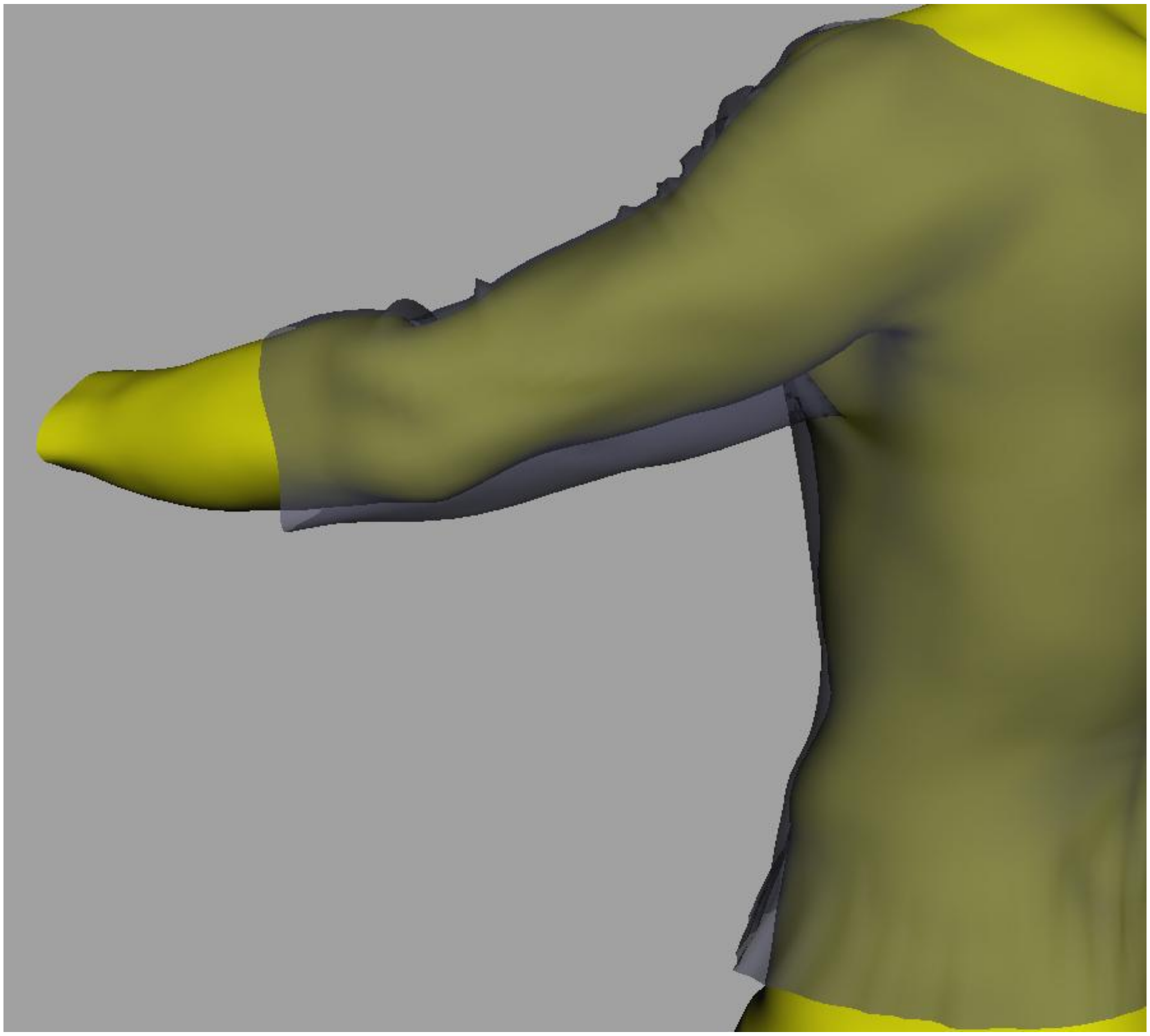


Head geometry is built using the traditional polygonal modeling technique. High resolution model is not built for the head but instead the geometry is smoothed once to generate the normal map.

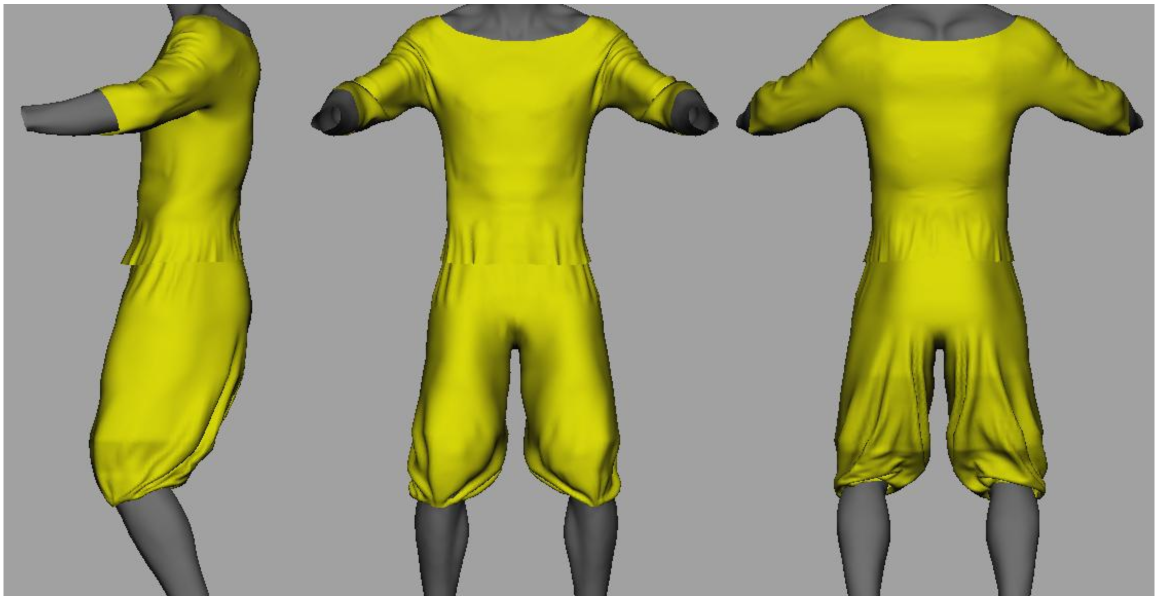
Modeling the cloth



nCloth is used to build the medium resolution cloth model. Since the cloth dynamics tweaking is not necessary for modeling the cloth mesh, the setup is simple. Most of the attribute can remain as default. Editing thickness attribute is most effective to define the look of the cloth. Space scale attribute in nucleus node is used to adjust the simulation scale.

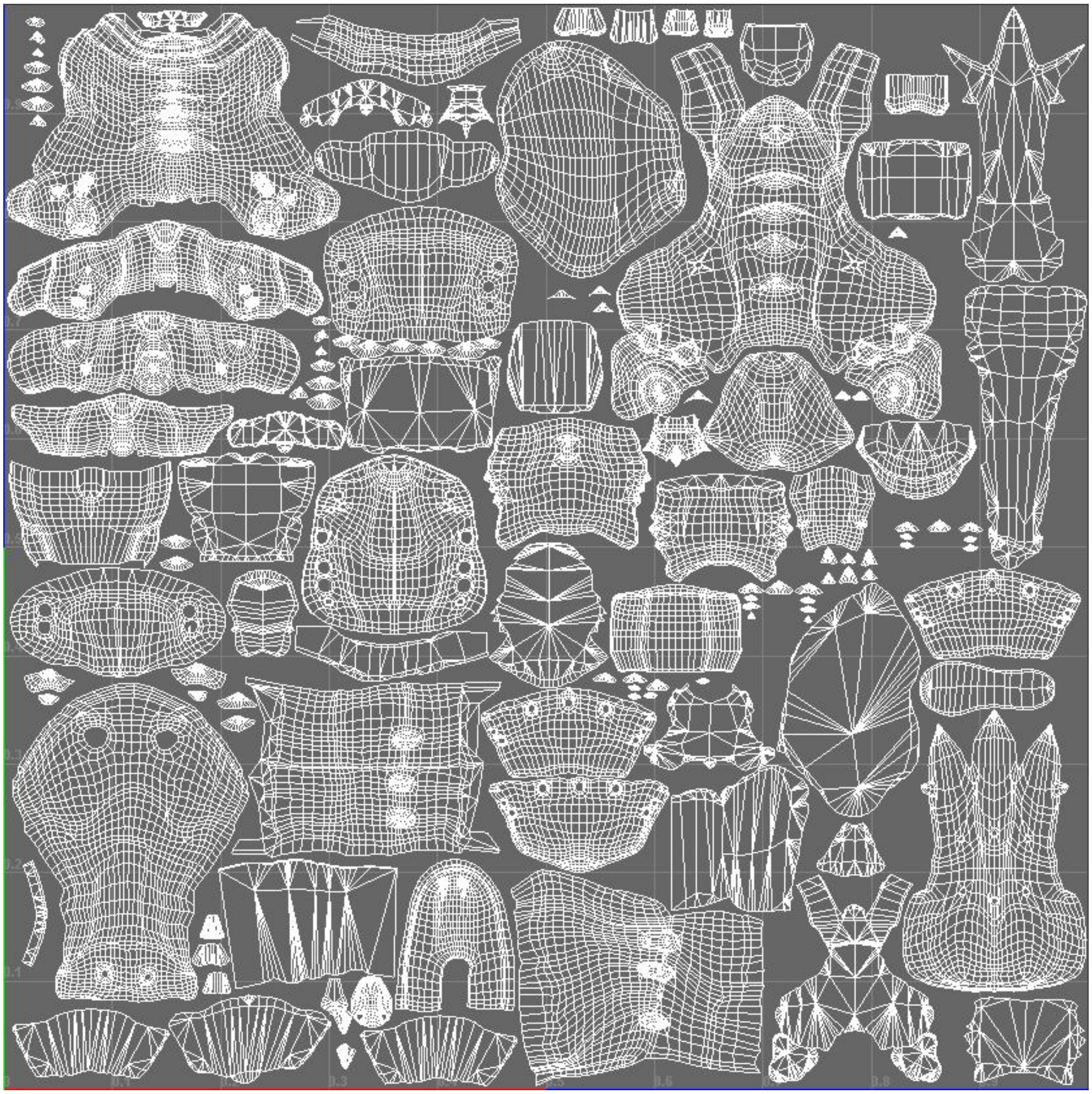


It is important to have a high quality collision mesh as it defines the look of the cloth. The collision mesh is skinned to deform so that you can animate the collision mesh to sculpt cloth to your needs.



The character bind pose is show above. This is an effective pose as all the joint rotations are mostly placed in halfway to the extreme rotations. This helps the deformations of the character and also you can get a natural looking cloth mesh deformation for most of the cases for the in-game mesh.

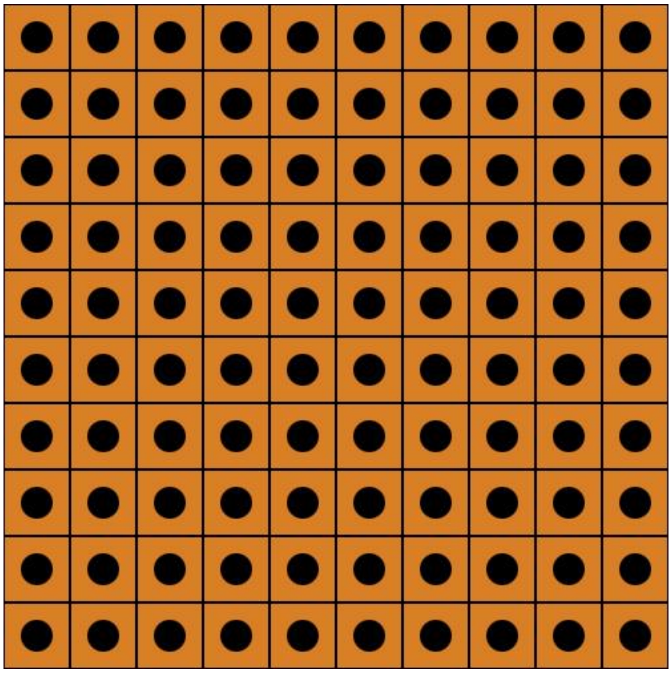
UV



Medium resolution model is unwrapped. The UV on the medium resolution is inherited to the game resolution and high resolution model.

Un-wrap UV's on medium resolution mesh

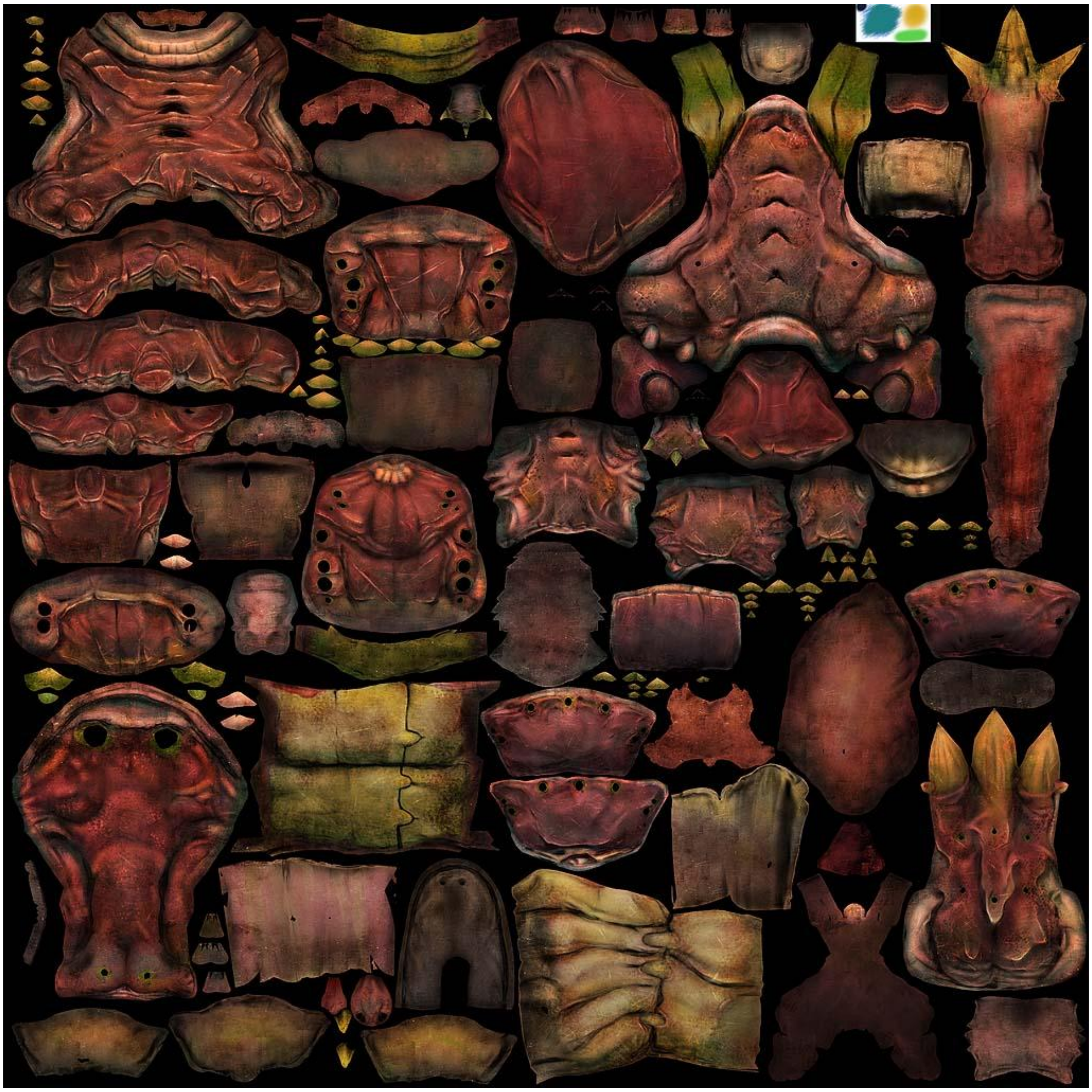
Unfold UV tool is a very powerful tool for unwrapping organic surface UV. However, unfold UV tool often gives you unexpected results when it is used on a complex surface such as the armor. To get the expected result for the tool, you need to give more information to the tool by applying the tool to selected regions and pin borders/selected UV. Before unfolding UV using the unfold UV tool, first you need to define the regions of plates. After you divide the model into separate regions, apply planar projection to each region. Make sure that the projection width shares the same value as the projection height and the value needs to be the same for all the planar projection you apply for all the regions. This insures that the planar projection is square and all the regions are in the same scale. For some cases, custom projection geometry is used to project its UV onto the final mesh. Projection mesh is built with Nurbs first as it has an even UV space and then it's converted to polygon for the projection. Transfer attribute tool is used for the UV projection.



The black circle pattern is especially handy when you are editing UV for the face. Notice that you can clearly see where it is stretching and warping in the screen shot above.

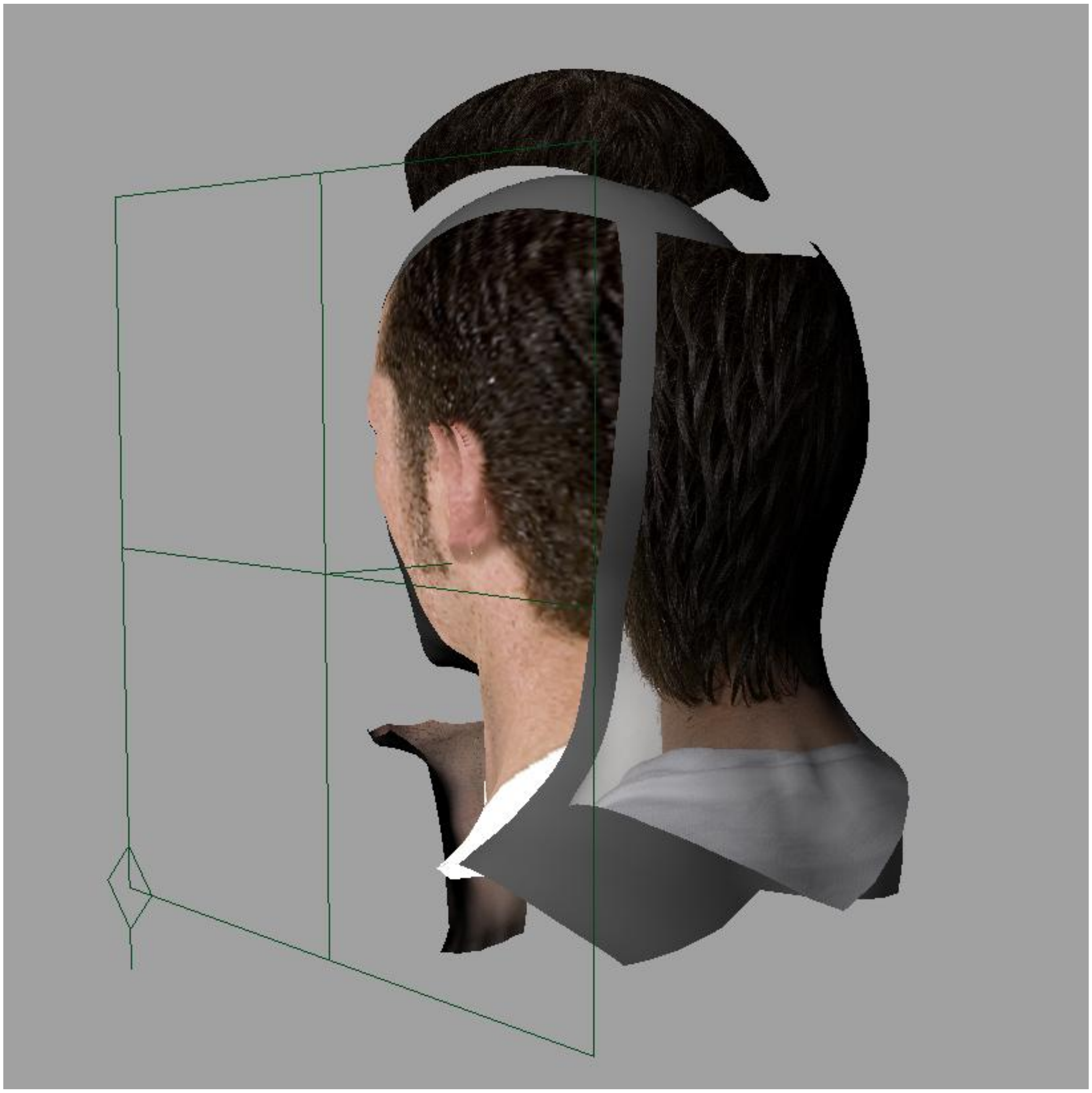
Texturing Process

Brief texture painting



- Painting a texture that reads well overall, for both in-game and pre-render.
  - Subtleties in details.
  - Dark and light areas (contrast).
  - Keeping with original color palette (lobster colors☺).
  - Making sure fidelity of rendering is consisting throughout the texture.

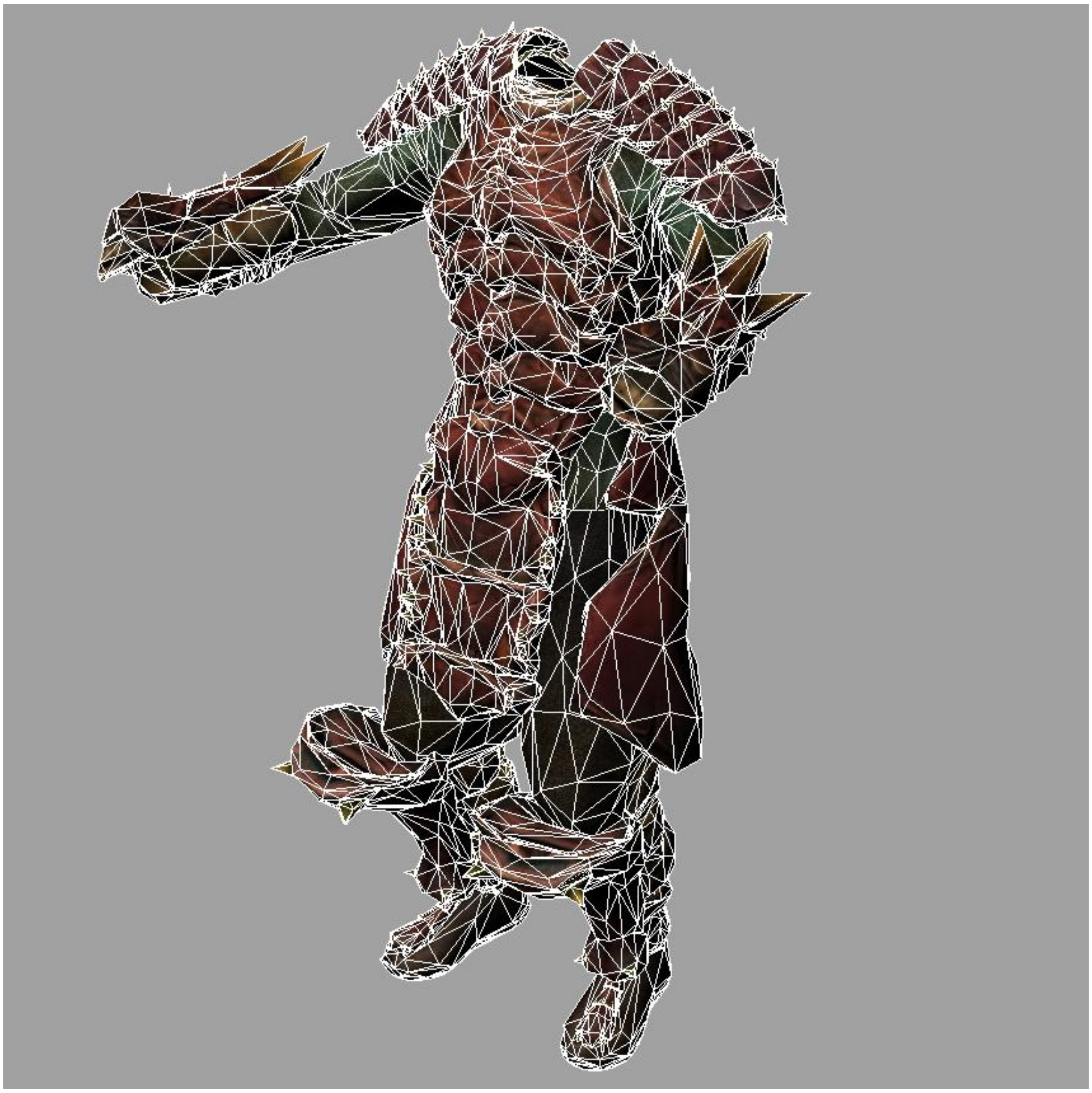
Projection painting



Two projection painting techniques are used to project photo on the head mesh. First technique is by building custom projection mesh with easy to paint UV, and project the texture information to the target geometry using Transfer Maps. Second technique is projecting texture using "projection as file texture" and baking the texture using "Convert to File Texture"

Modeling Game Resolution Character

Geometry reduction to fit the game constrains

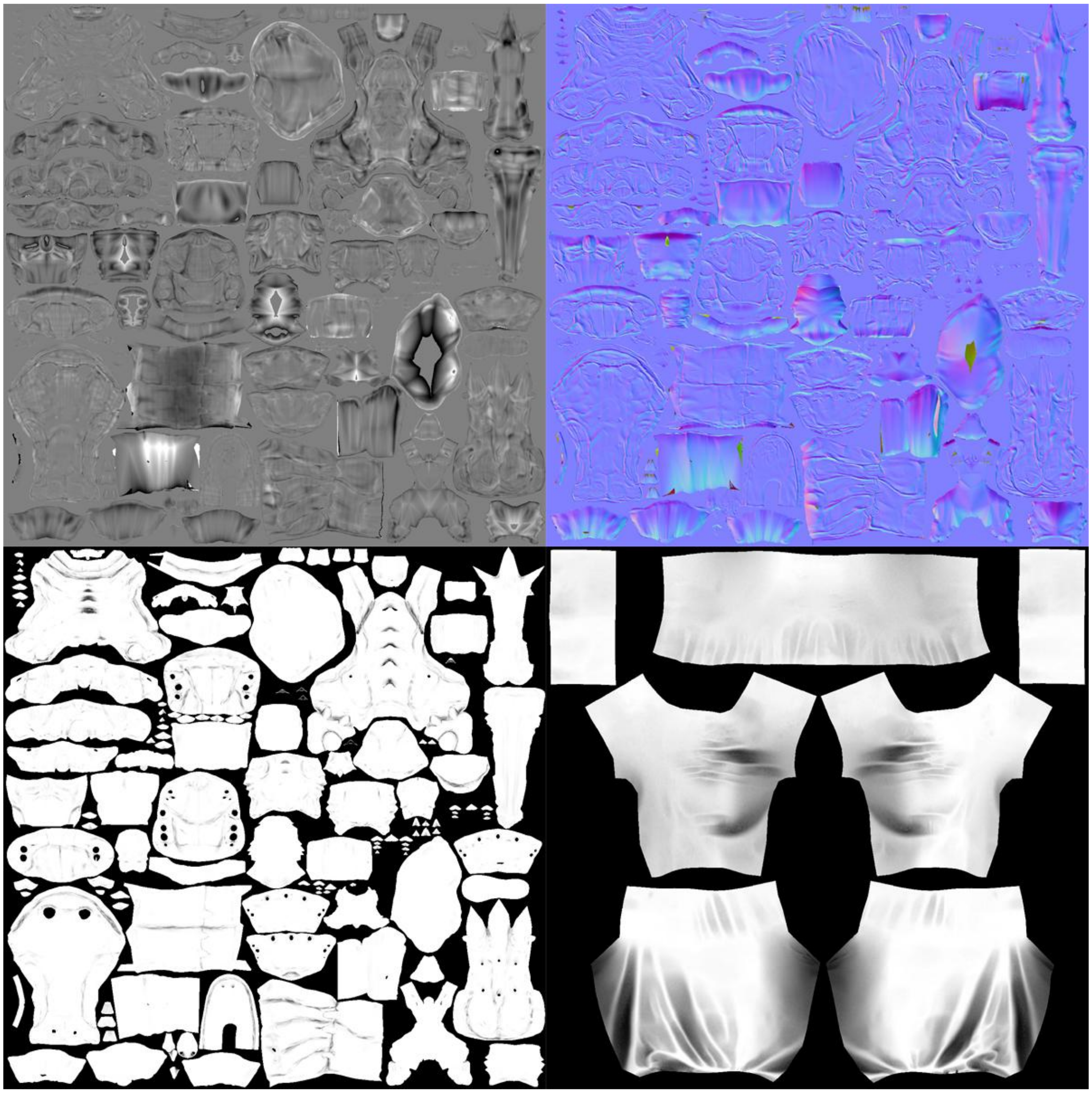


Progressive mesh plug-in is the foundation of reducing medium resolution model. It is used to do the first path geometry reduction. This tool will generate a very good starting point for the game resolution model. This tool is written by Erik Pojar and for more information and downloading progressive mesh plug-in, please visit Erik’s website http://www.pojar.net/ProgressiveMesh/. After the mesh is procedurally reduced, the mesh is reduced again by hand for the final fine tuning. You can also use ZBrush's decimation master to get the similar result.

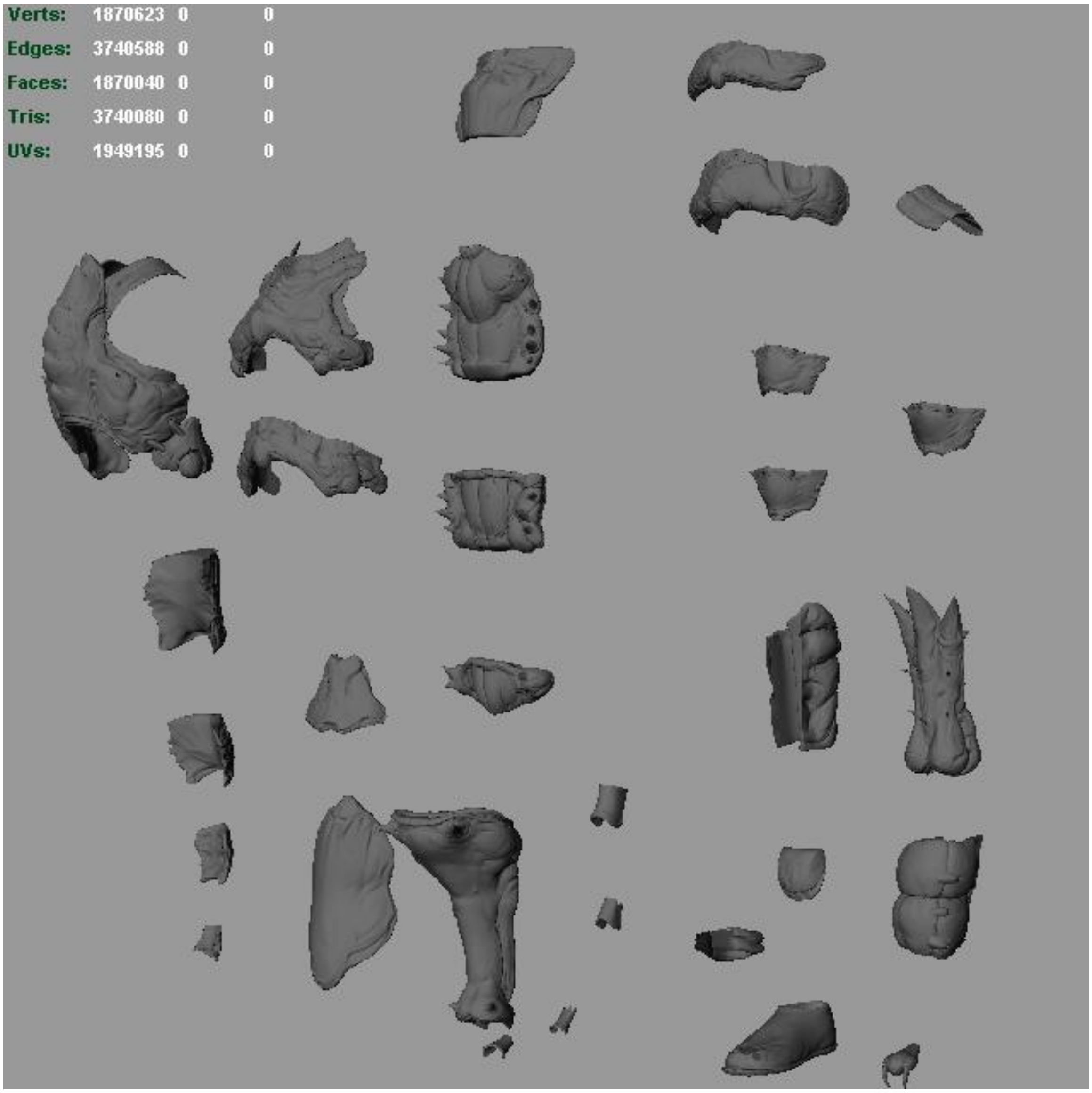
UV transfer from high resolution to game resolution

During the polygon reduction process, UVs often get broken. To fix this problem, used the Transfer attributes tool to project the UV from the medium resolution model to the game resolution model.

Texture transfer



Displacement map, normal map and ambient occlusion map are generated from the high resolution geometry using Transfer Maps. For the cloth mesh, the occlusion is baked on the vertices first using Batch Bake, and then the vertex colors are converted to texture using Paint Vertex Color Tool Export option.

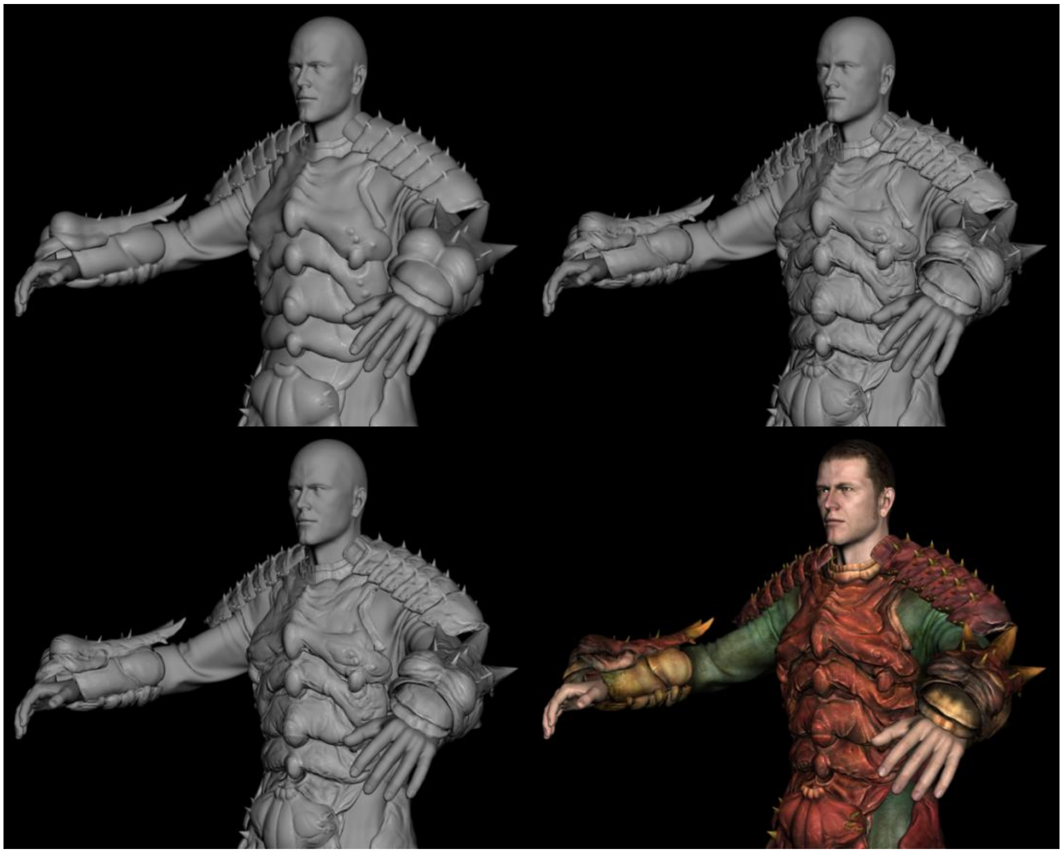


```
Verts:   1870623  0   0
Edges:   3740588  0   0
Faces:   1870040  0   0
Tris:    3740080  0   0
UVs:     1949195  0   0
```

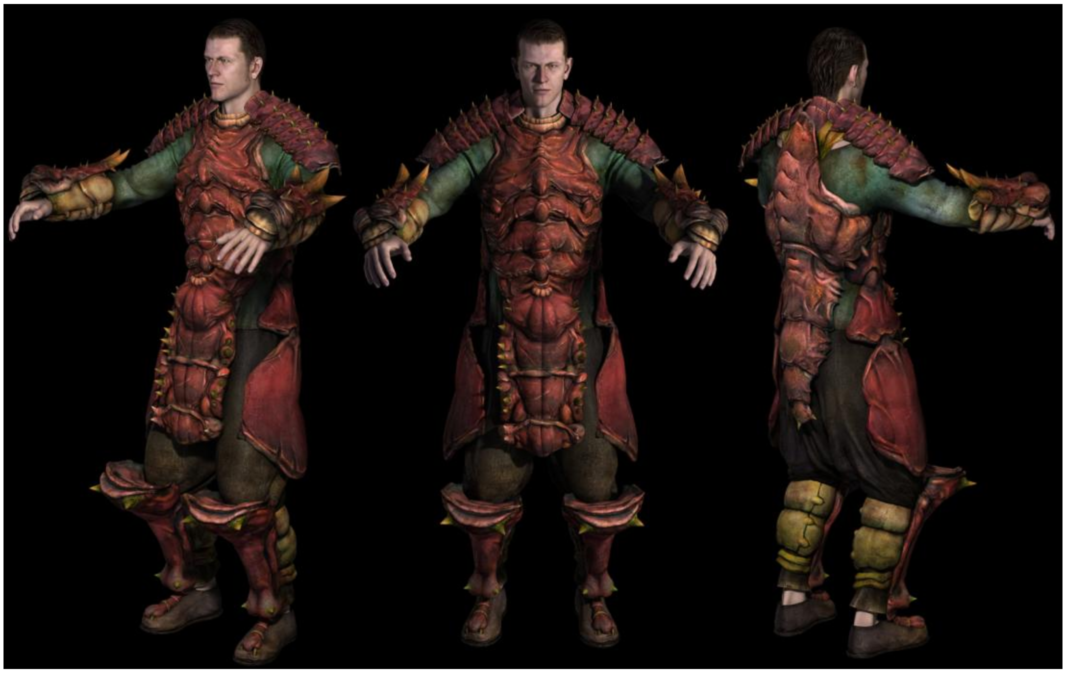
All the textures are baked at once by placing every part of the armor apart like shown above. This technique however often causes to run out of memory. That case, the bake process needs to be divided into few sections. 64 bit Maya is recommended to do memory intensive process such as texture baking. It can save many hours of baking process.

Rendering

Software rendering

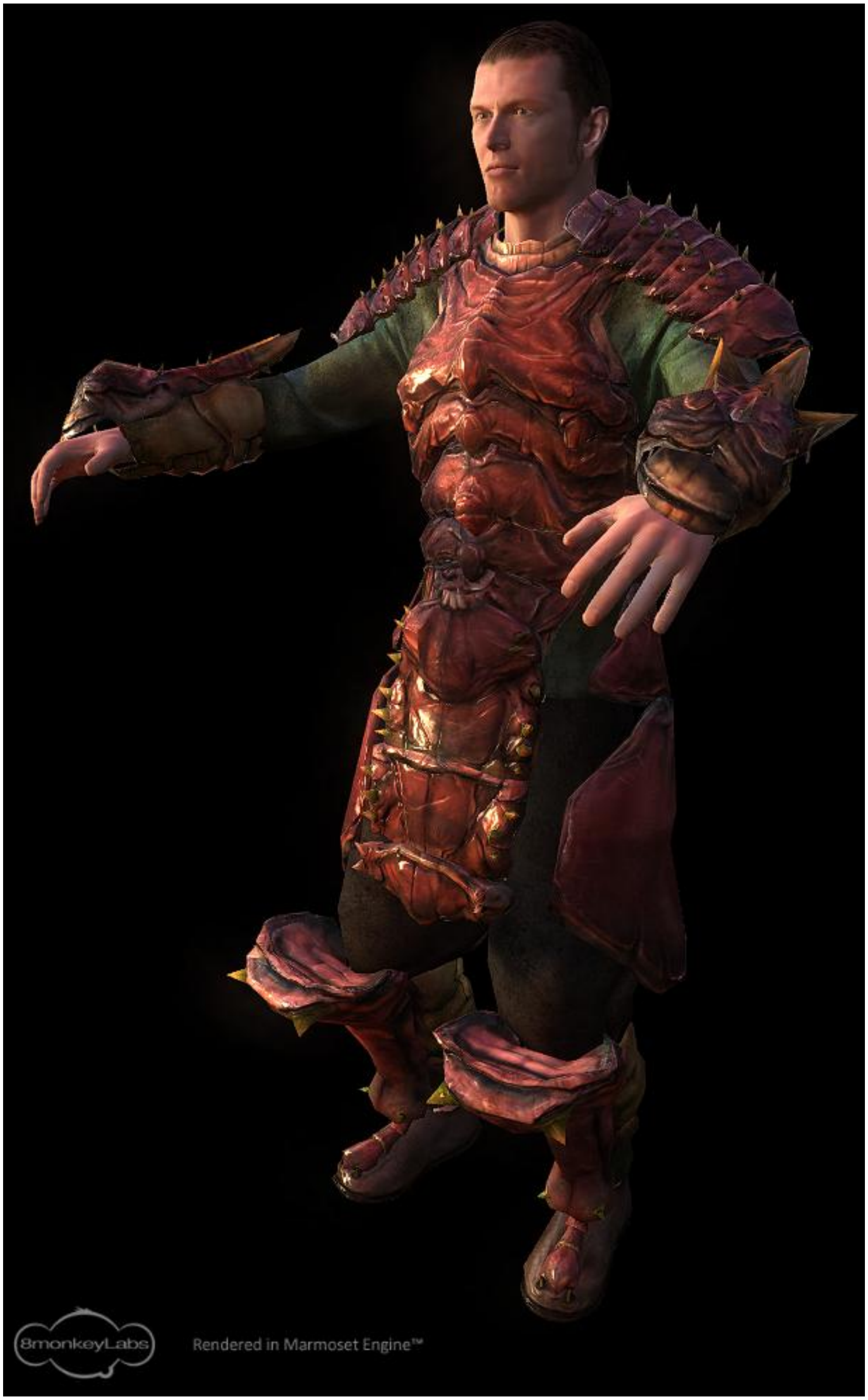


The character is rendered in Mental Ray. Normal map/Displacement map combination is used to apply the high resolution model detail on the medium resolution model.



HDRI, final gather and one spot light with soft shadow are used for the default pose character render.

Hardware rendering



The image above is rendered in Marmoset Engine.
http://www.8monkeylabs.com/ 8 Monkey Labs' toolbag is a very fast and user friendly sets of tools to quickly preview your character content in the game space. HDR lighting is also available in toolbag. Color maps, spec maps, bump maps and normal maps were used to render the image above.

Conclusion

In this class, it was demonstrated that the approach of building a game resolution model based on a high resolution asset, produces successful content for games. I hope to see these techniques used in many game productions. Feel free to contact us.

Credit

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Erik Pojar
Website: www.pojar.net/ProgressiveMesh/