Animation import guide

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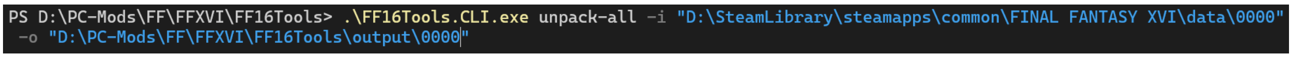
Requirements

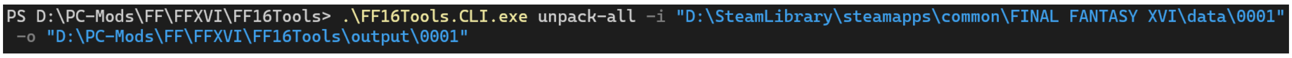
- FF16Tools
- MdlConverter
- Blender (or another 3D animation software tool)
- 010 Editor (or another hex editor)[1]

Preparation

First, use **FF16Tools** to unpack the animation and character *pac* files (0000 and 0001 respectively).

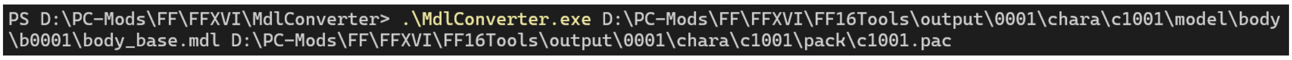


```
PS D:\PC-Mods\FF\FFXVI\FF16Tools> .\FF16Tools.CLI.exe unpack-all -i "D:\SteamLibrary\steamapps\common\FINAL FANTASY XVI\data\0000"
 -o "D:\PC-Mods\FF\FFXVI\FF16Tools\output\0000"
```



```
PS D:\PC-Mods\FF\FFXVI\FF16Tools> .\FF16Tools.CLI.exe unpack-all -i "D:\SteamLibrary\steamapps\common\FINAL FANTASY XVI\data\0001"
 -o "D:\PC-Mods\FF\FFXVI\FF16Tools\output\0001"
```

Then, export the character you want to animate with **MdlConverter**. You need to pass to the program the path to the model file plus the path to its related *pac* file[2].



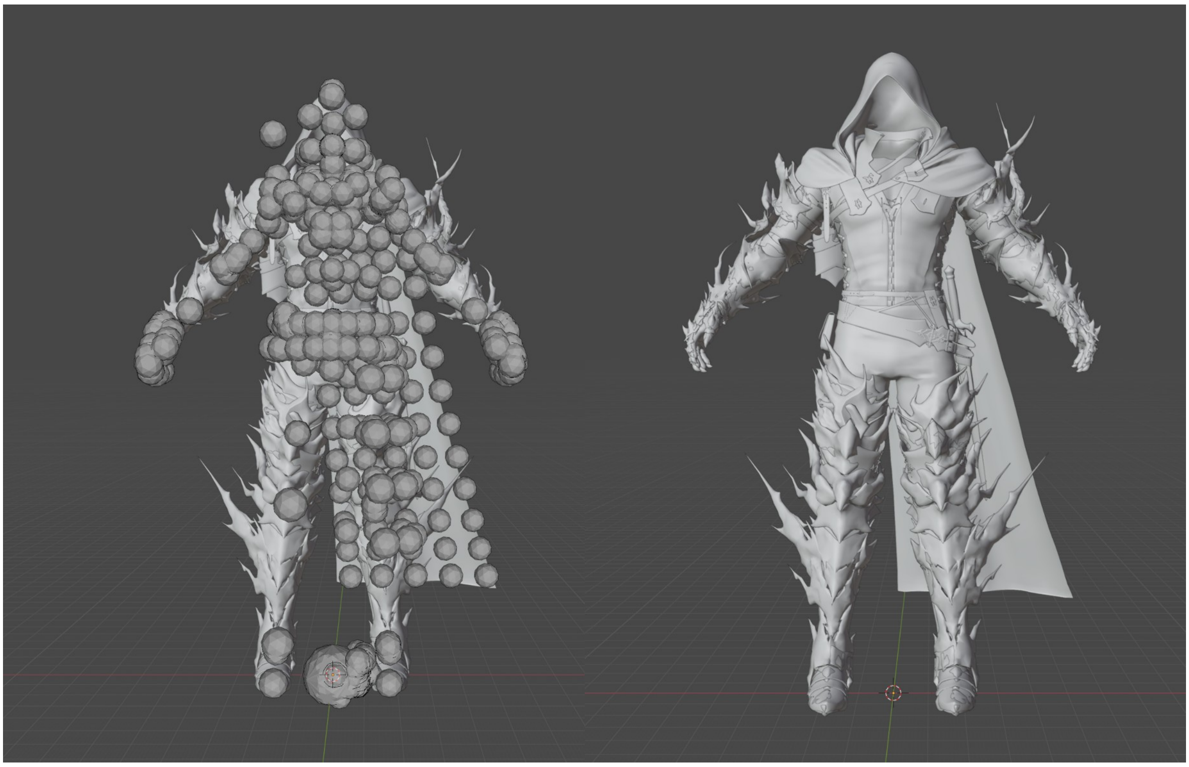
```
PS D:\PC-Mods\FF\FFXVI\MdlConverter> .\MdlConverter.exe D:\PC-Mods\FF\FFXVI\FF16Tools\output\0001\chara\c1001\model\body
\b0001\body_base.mdl D:\PC-Mods\FF\FFXVI\FF16Tools\output\0001\chara\c1001\pack\c1001.pac
```

Animating

Import the character's model to Blender (or your chosen 3D animation program). It is recommended to use LOD0 to have a clear view of the effects your animation will have over the body. You can use Blender GLTF importer's default settings for this.

[1] While not strictly necessary, it is recommended to use 010 Editor. It will be easier to use compared to other hex editors, thanks to Nenkai's templates about FFXVI file formats.

[2] To know where each character is located, consult here.

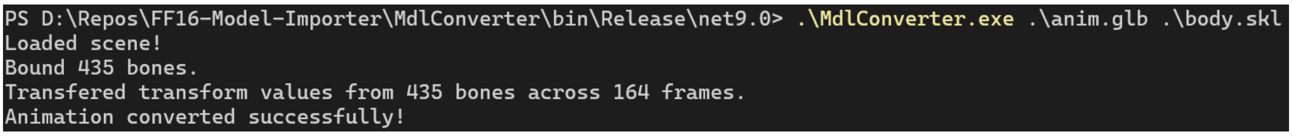


At this step, you should use your animation-related knowledge to create an action, set poses, add those poses as keyframes, and so on, to make an animation from zero[3]. For existing animations (those that proceed from retargeting), look at Troubleshooting.

When you have your animation ready, you should export the model's armature (the meshes can be included if desired but aren't necessary for this process). MdlConverter's **animation import only works with GLTF files,** so export your creation accordingly. You can use Blender GLTF exporter's default settings for this.

Import

You should unpack the character's *pac* file from earlier, and obtain the character's skeleton file (usually, *body.skl*). Then, use MdlConverter with your animation GLTF file and the skeleton file as parameters[4][5].



```
PS D:\Repos\FF16-Model-Importer\MdlConverter\bin\Release\net9.0> .\MdlConverter.exe .\anim.glb .\body.skl
Loaded scene!
Bound 435 bones.
Transfered transform values from 435 bones across 164 frames.
Animation converted successfully!
```

Now, you can replace an animation from the game with your newly generated *anmb* file. But, for the animation to loop correctly, there's a need to modify the replaced animation's related timeline (*tlb*) file.

[3] While not necessary, it is recommended to work with quaternion-based rotations.

[4] The difference in bone count between this program and Blender is accounted for (when exporting a model, various skeletons other than the body one are merged).

[5] The difference in frame count is also normal behavior. It is probably related to optimization and fusion of duplicate keyframes in the multiple export/import operations and because of how the GLTF format works.

Adjustments

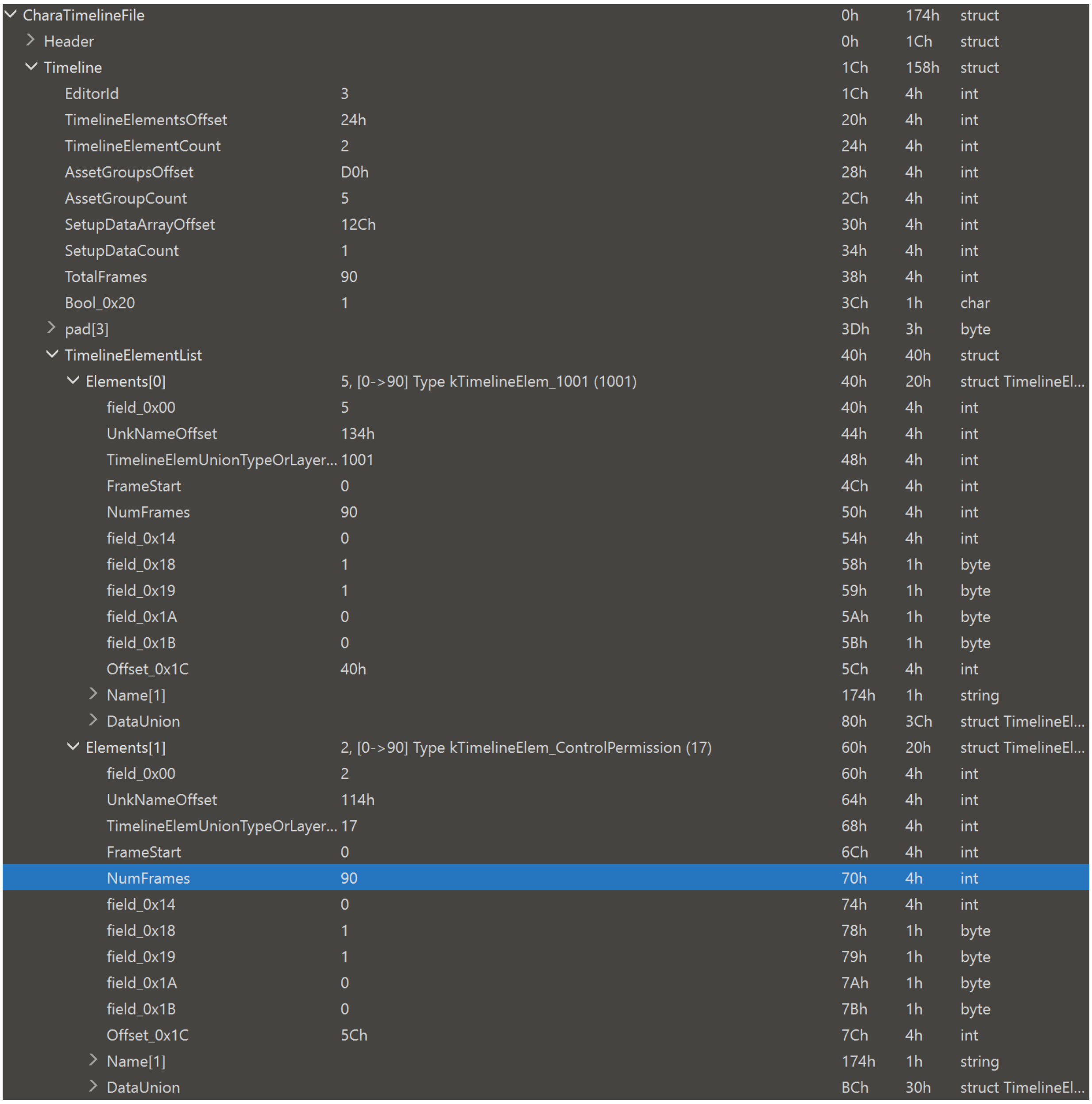
Open your hex editor (preferably, 010 Editor with [Nenkai's *tlb* template]) and open the related timeline file. For example, if you are replacing:

```
0000\animation\chara\c1001\animation\a0001\common\normal\idle.anmb
```

You need to edit:

```
0001\chara\c1001\timeline\t0001\common\normal\idle.tlb
```

Now, run the template to know what fields to edit.



```
v CharaTimelineFile                                                                      0h     174h  struct
  > Header                                                                               0h     1Ch   struct
  v Timeline                                                                             1Ch    158h  struct
      EditorId                      3                                                    1Ch    4h    int
      TimelineElementsOffset        24h                                                  20h    4h    int
      TimelineElementCount          2                                                    24h    4h    int
      AssetGroupsOffset             D0h                                                  28h    4h    int
      AssetGroupCount               5                                                    2Ch    4h    int
      SetupDataArrayOffset          12Ch                                                 30h    4h    int
      SetupDataCount                1                                                    34h    4h    int
      TotalFrames                   90                                                   38h    4h    int
      Bool_0x20                     1                                                    3Ch    1h    char
    > pad[3]                                                                             3Dh    3h    byte
    v TimelineElementList                                                                40h    40h   struct
      v Elements[0]                 5, [0->90] Type kTimelineElem_1001 (1001)            40h    20h   struct TimelineEl...
          field_0x00                5                                                    40h    4h    int
          UnkNameOffset             134h                                                 44h    4h    int
          TimelineElemUnionTypeOrLayer... 1001                                           48h    4h    int
          FrameStart                0                                                    4Ch    4h    int
          NumFrames                 90                                                   50h    4h    int
          field_0x14                0                                                    54h    4h    int
          field_0x18                1                                                    58h    1h    byte
          field_0x19                1                                                    59h    1h    byte
          field_0x1A                0                                                    5Ah    1h    byte
          field_0x1B                0                                                    5Bh    1h    byte
          Offset_0x1C               40h                                                  5Ch    4h    int
        > Name[1]                                                                        174h   1h    string
        > DataUnion                                                                      80h    3Ch   struct TimelineEl...
      v Elements[1]                 2, [0->90] Type kTimelineElem_ControlPermission (17) 60h    20h   struct TimelineEl...
          field_0x00                2                                                    60h    4h    int
          UnkNameOffset             114h                                                 64h    4h    int
          TimelineElemUnionTypeOrLayer... 17                                             68h    4h    int
          FrameStart                0                                                    6Ch    4h    int
          NumFrames                 90                                                   70h    4h    int
          field_0x14                0                                                    74h    4h    int
          field_0x18                1                                                    78h    1h    byte
          field_0x19                1                                                    79h    1h    byte
          field_0x1A                0                                                    7Ah    1h    byte
          field_0x1B                0                                                    7Bh    1h    byte
          Offset_0x1C               5Ch                                                  7Ch    4h    int
        > Name[1]                                                                        174h   1h    string
        > DataUnion                                                                      BCh    30h   struct TimelineEl...
```

The fields you need to modify are **TotalFrames** (in the Timeline section) and **NumFrames** (in the TimelineElementList subsection Elements entries). You should try to set this value to the last keyframe number used by your animation in Blender or the frame count number logged by the importer. If the animations still not loops correctly, you should increase or decrease the value accordingly until you achieve an optimal result.

Troubleshooting

For retargeted animations, there could be a non easily discernible mismatch between the character's skeleton before and after the process, a slight difference in the rest position, etc. While not an absolute fix, you can try to:

- Reimport the character's skeleton.
- Retarget again (from your skeleton with a retargeted animation to the newly imported one).
- Create a new action.
- Select your new skeleton, go to Pose Mode, select all and copy all keyframes.
- Go to the new action, insert current pose (as placeholder) as a new keyframe, and paste.
- Unlink the action in-use (retargeted one) and set this new action as the one in use in your new skeleton.
- Export the new skeleton.