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Particles Project Optimization Log

<u>Changelist: 14006</u> (November 16, 2019)

- Change Double to Floats for Vect4D and Matrix functions/methods, operators, constructor
  - Approximately -5ms for "Update" time in release

<u>Changelist: 14046</u> (November 16, 2019)

- Change Double to Floats for gl in ParticleEmitter and other variables as well which I overlooked in Vect4D and Matrix
  - Approximately -8ms in total for "Update" time in release

```
LoopTime: update:24.247101 ms   draw:129.749603 ms   tot:153.996689
LoopTime: update:23.303200 ms   draw:137.889099 ms   tot:161.192291
LoopTime: update:23.589100 ms   draw:127.407211 ms   tot:150.996307
LoopTime: update:23.903200 ms   draw:124.998703 ms   tot:148.901917
LoopTime: update:24.222601 ms   draw:129.257507 ms   tot:153.480103
LoopTime: update:27.398201 ms   draw:130.134293 ms   tot:157.532501
LoopTime: update:23.201200 ms   draw:132.099701 ms   tot:155.300903
LoopTime: update:24.370100 ms   draw:129.154297 ms   tot:153.524399
LoopTime: update:23.630301 ms   draw:133.661407 ms   tot:157.291718
LoopTime: update:23.652199 ms   draw:130.662399 ms   tot:154.314590
LoopTime: update:23.486099 ms   draw:132.485504 ms   tot:155.971619
```

<u>Changelist: 14061 & 14143 & 14155 & 14221</u> (November 16-17, 2019)

- Convert Vect4D & Matrix into SIMD math (Errors/Warnings occurred)
- Tried to change sqrt(), but unfortunately the original one seems to run faster
- Fixing Errors/Warnings with SIMD for Vect4D & Matrix (Still not working)

<u>Changelist: 14359 & 14394</u> (November 17, 2019)

- FINALLY fixed SIMD for Vect4D & Matrix!!!!!!!!!!!! , added construction for Matrix from input of Vectors
- Change Vect4D using RVO returns
  - Approximately -7ms in total for "draw" time in release

```
LoopTime: update:28.747700 ms   draw:120.416199 ms   tot:149.163895
LoopTime: update:24.640999 ms   draw:117.290604 ms   tot:141.931595
LoopTime: update:24.578800 ms   draw:116.952797 ms   tot:141.531601
LoopTime: update:25.359501 ms   draw:117.517403 ms   tot:142.876907
LoopTime: update:25.462400 ms   draw:122.509102 ms   tot:147.971497
LoopTime: update:24.821301 ms   draw:116.275696 ms   tot:141.097000
LoopTime: update:24.720200 ms   draw:121.422501 ms   tot:146.142685
LoopTime: update:24.749201 ms   draw:116.093903 ms   tot:140.843109
LoopTime: update:24.255199 ms   draw:126.859398 ms   tot:151.114594
LoopTime: update:26.480301 ms   draw:113.467003 ms   tot:139.947296
```

Changelist: 14402 & 14469 (November 17, 2019)
- Added const to Vect4D and Matrix functions/methods, operators…

Changelist: 14515 (November 17, 2019)
- Added const to Particle functions/methods
- Removed potentially unnecessary code in Particle Update(), no change to particles visually
- Encountered warning regarding to alignment (try to fix, but not yet resolved)

Changelist: 14551 (November 18, 2019)
- Added const for Particle & ParticleEmitter
- Moved gl out of forloop in ParticleEmitter in draw()
  - Approximately -5ms for "draw" time in release

```
LoopTime: update:26.086500 ms  draw:109.567101 ms  tot:135.653595
LoopTime: update:25.214600 ms  draw:114.449600 ms  tot:139.664200
LoopTime: update:26.462700 ms  draw:104.995506 ms  tot:131.458206
LoopTime: update:24.733902 ms  draw:106.116798 ms  tot:130.850708
LoopTime: update:24.897600 ms  draw:108.872101 ms  tot:133.769699
LoopTime: update:25.098801 ms  draw:111.265503 ms  tot:136.364304
LoopTime: update:24.046200 ms  draw:105.873207 ms  tot:129.919403
LoopTime: update:29.009701 ms  draw:107.773300 ms  tot:136.783005
LoopTime: update:32.226601 ms  draw:104.934402 ms  tot:137.160995
LoopTime: update:23.606300 ms  draw:119.806000 ms  tot:143.412292
LoopTime: update:24.991400 ms  draw:109.808197 ms  tot:134.799606
```

Changelist: 14661 & 14681 & 14786 & 14813 (November 18, 2019)
- Second attempt on changing sqrt() to SIMD
- Commented out unsure but doesn't affect particles codes in Update & Draw
- Combined While Loop in Update
- Changed Cross Product to SIMD

```
LoopTime: update:24.468100 ms  draw:120.094406 ms  tot:144.562500
LoopTime: update:21.607500 ms  draw:114.211601 ms  tot:135.819107
LoopTime: update:22.534000 ms  draw:114.502304 ms  tot:137.036316
LoopTime: update:21.008900 ms  draw:113.075905 ms  tot:134.084808
LoopTime: update:22.419300 ms  draw:109.096504 ms  tot:131.515808
LoopTime: update:22.785601 ms  draw:110.969604 ms  tot:133.755203
LoopTime: update:21.597700 ms  draw:109.348404 ms  tot:130.946106
LoopTime: update:21.225899 ms  draw:113.935501 ms  tot:135.161407
LoopTime: update:20.674801 ms  draw:111.081001 ms  tot:131.755798
LoopTime: update:20.678799 ms  draw:117.939400 ms  tot:138.618195
```

Changelist: 14824 (November 19, 2019)

- Change compiler settings (Approximately -2ms)