What are the adv & disadv to ray tracing?

Definition

* generating an [image](http://en.wikipedia.org/wiki/Digital_image) by tracing the path of [light](http://en.wikipedia.org/wiki/Light) through [pixels](http://en.wikipedia.org/wiki/Pixel) in an [image plane](http://en.wikipedia.org/wiki/Image_plane) and simulating the effects of its encounters with virtual objects.

Advantages

* realistm higher than [scanline rendering](http://en.wikipedia.org/wiki/Scanline_rendering) methods
* best suited for applications where the image can be rendered slowly ahead of time, such as in still images and film and television [visual effects](http://en.wikipedia.org/wiki/Visual_effects)
* Ray tracing's popularity stems from its basis in a realistic simulation of [lighting](http://en.wikipedia.org/wiki/Computer_graphics_lighting) over other rendering methods (such as scanline rendering or ray casting).
* Effects such as reflections and [shadows](http://en.wikipedia.org/wiki/Shadow), which are difficult to simulate using other algorithms, are a natural result of the ray tracing algorithm. The computational independence of each ray makes ray tracing amenable to [parallelization](http://en.wikipedia.org/wiki/Parallelization).

Disadvantages

* performance - great computational cost
* poorly suited for real-time applications like [video games](http://en.wikipedia.org/wiki/Video_game) where speed is critical.
* Scanline algorithms and other algorithms use data coherence to share computations between pixels,
  + while ray tracing normally starts the process anew, treating each eye ray separately.
  + However, this separation offers other advantages, such as the ability to shoot more rays as needed to perform [spatial anti-aliasing](http://en.wikipedia.org/wiki/Spatial_anti-aliasing) and improve image quality where needed.
* Although it does handle interreflection and optical effects such as refraction accurately, traditional ray tracing is also not necessarily photorealistic.
* The realism of all rendering methods can be evaluated as an approximation to the equation. Ray tracing, if it is limited to Whitted's algorithm, is not necessarily the most realistic. Methods that trace rays, but include additional techniques ([photon mapping](http://en.wikipedia.org/wiki/Photon_mapping), [path tracing](http://en.wikipedia.org/wiki/Path_tracing)), give far more accurate simulation of real-world lighting.