Game AI Planning
Which GPU for how many NPCs?

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Motivation

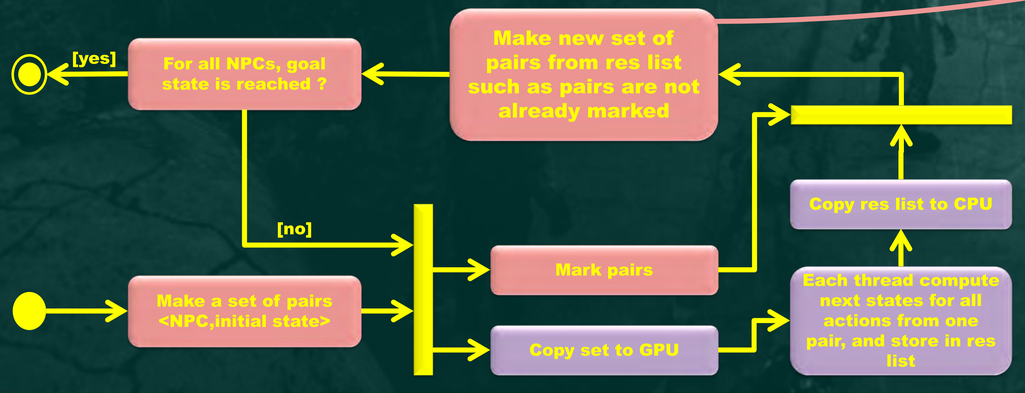
- GPGPU for the future of Game AI [c,d,e]
- Games use planning [a,b,f,g] (plans of at most 4-6 actions, for 50 bots max)
- Previous work shows encouraging speed-up [h]

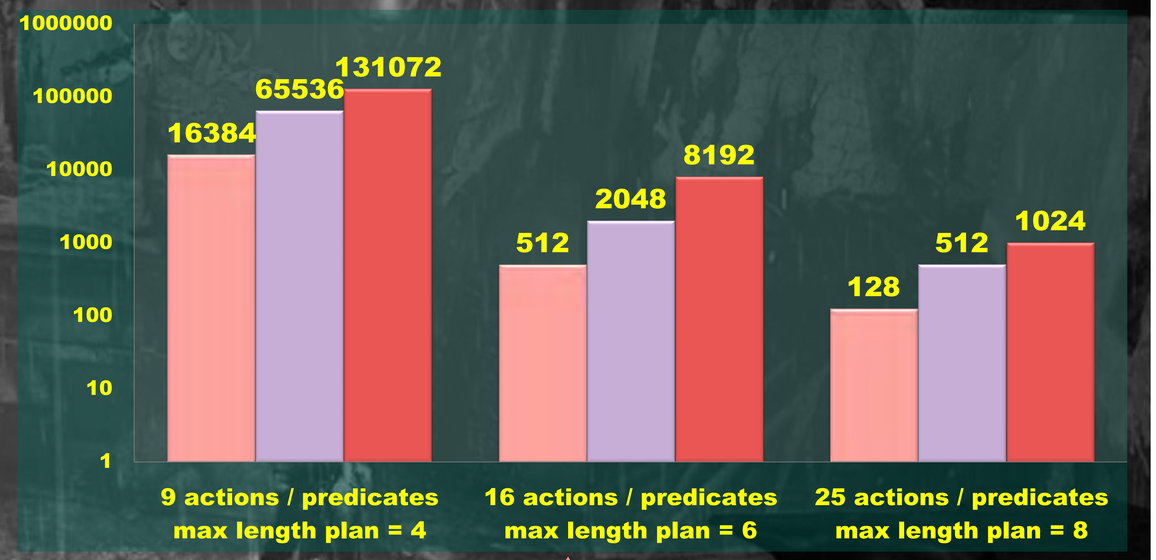
GPU and Planning

- GPU is designed for Matrix & Vector of integers
- *What* integer-based *representation to encode* planning *predicates*, *states* and *actions*?
- One bit == One predicate; e.g. ennemy-is-dead
- One state is 32 predicates max (32-bit integer)

GOAP [a]-like Grounded Planning

- Instantiated actions: attack-ennemy, dodge, patrol, flee, cover, ... (32 actions max)
- 64-bit integer (plan length at most 12 actions [g])
- Breadth-first search for each NPC





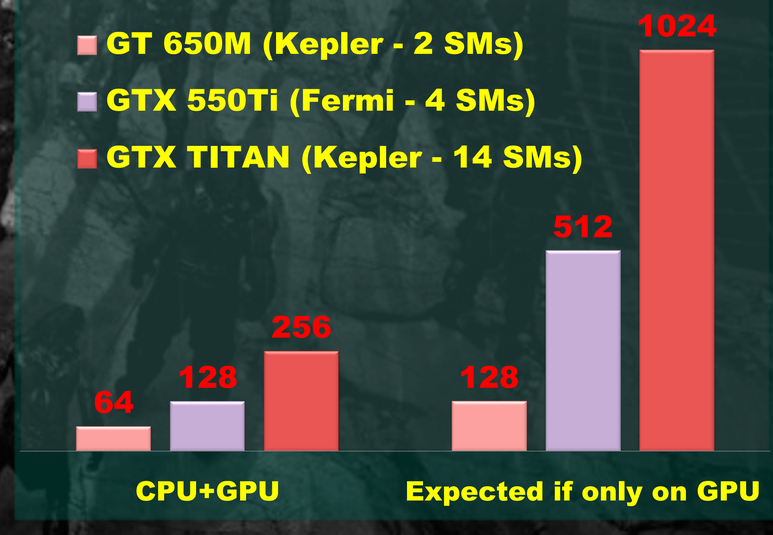
More NPCs if the algorithm is completely in GPU

Experiments

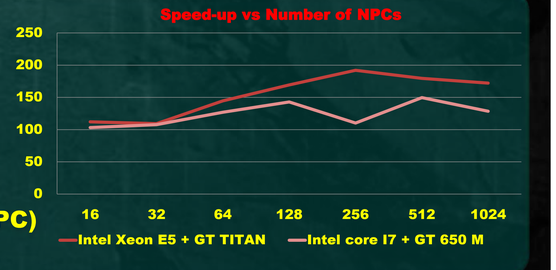
- 1GB used max on GPU
- GT 650M on Intel core i7 2.3GHz
- GTX 550Ti on core 2 duo 2.2GHz
- GTX TITAN on Xeon E5 2.7GHz

- On a simple planning problem: Blocks World (3, 4 and 5 blocks)
- Random initial and goal states

Planning for how many NPCs per frame?



GPU planning 150 faster than CPU planning (one breadth-first search for each NPC)



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h – Stéphane CARDON, Éric JACOPIN – CUDA Constraint Programming for AI Gaming in the Cloud – Poster at the NVIDIA GPU Technology Conference 2015