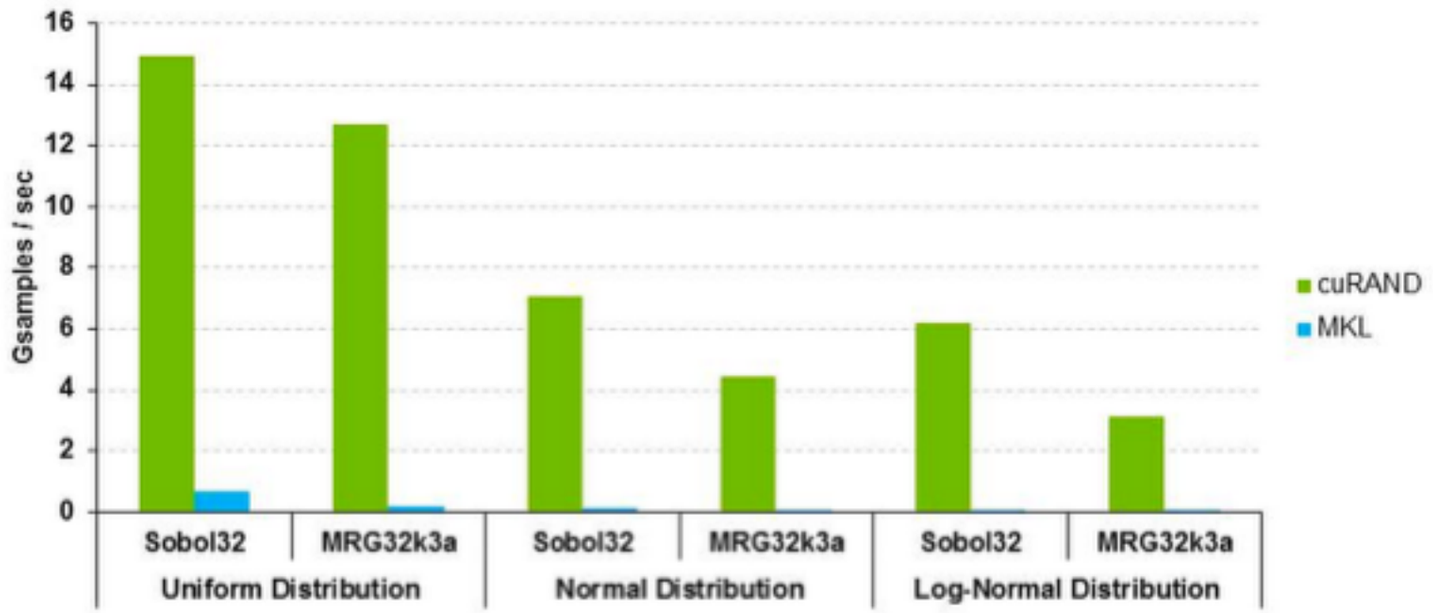
CURAND

Random number generation
presentation : https://developer.nvidia.com/cuRAND
toolkit documentation : http://docs.nvidia.com/cuda/curand/#axzz3YKIBNyuA

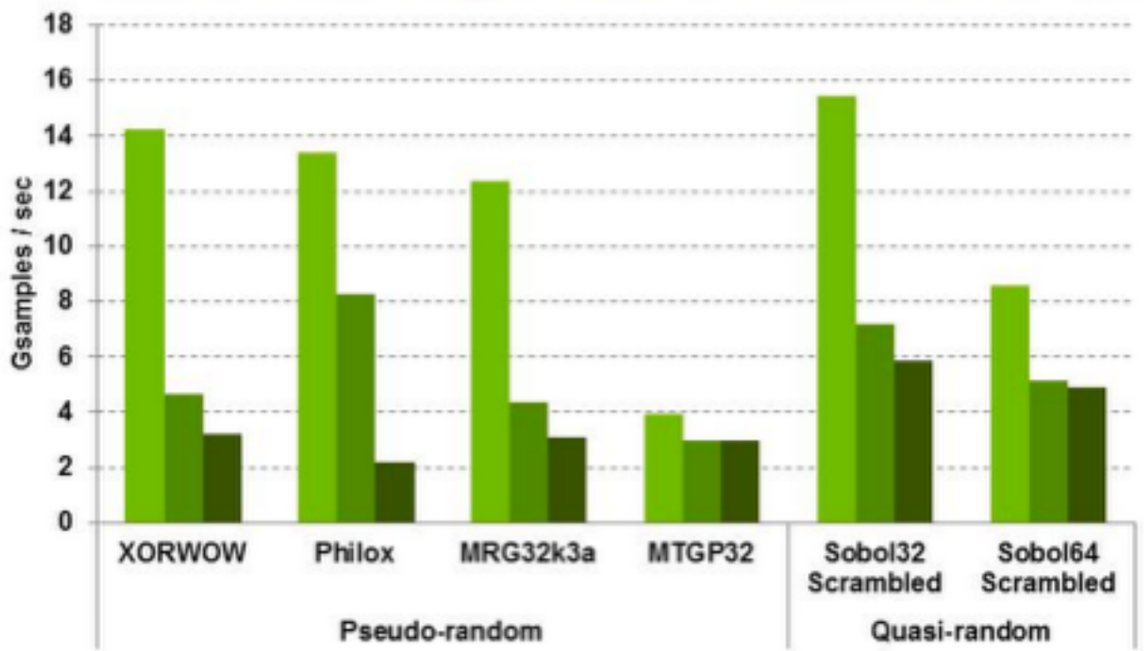
cuRAND: Up to 75x Faster vs. Intel MKL



Performance may vary based on OS version and motherboard configuration

- cuRAND 6.0 on K40c, ECC ON, double-precision input and output data on device
- MKL 11.0.1 on Intel SandyBridge 6-core E5-2620 @ 2.0 GHz

cuRAND: High Performance RNGs



Performance may vary based on OS version and motherboard configuration

- cuRAND 6.0 on K40m, ECC ON, double precision input and output data on device

Basic use : *host* side

1.Make a generator
curandGenerator_t gen;

2.Initialize
curandCreateGenerator(&gen, FLAG)
9 generators availables

3.Options
seed : curandSetPseudoRandomGeneratorSeed(gen, seed)
offset
…

4.curandGenerate() on allocated memory :
curandGenerateUniform(gen, &buffer, size)
curandGeneratePoisson(gen, &buffer, size, lambda)
curandGenerateNormal(gen, &buffer, size, mean, std)
…

5.Clean up :
curandDestroyGenerator()

Basic use : *device* side #include <curand_kernel.h>

1.Create :
curandState s; (or curandState_t)

2.Initialize :
__device__ void curand_init (unsigned long long **seed**, unsigned long long **sequence**, unsigned long long **offset**, curandState_t ***state**)

3.From device :
curand_uniform (curandState_t *state) ([0 1])
curand_normal (curandState_t *state) (N(0,1))
curand_log_normal (curandState_t *state, float mean, float stddev)
curand_poisson (curandState_t *state, double lambda)

- Also : curand_normal2 (curandState_t *state)
  advantages of box-muller transform

- other functions :
  skipahead…

- Errors are returned as curandStatus_t

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Case 1 : generate a random vector from host side

- Generate a random vector of size N from a Poisson distribution from *host* side with parameter lamba. Compute the mean (should be equal to lambda).

- Pay attention to what you pass to thrust::reduce. Hint : use thrust::device_pointer_cast

- Try varying the seed, and N

Case 2

- Generate a random vector on device using curand_init
- Try generating repetitive sequences