

GeantV VTune analysis

a first look
05/05/2015

- Profiling with VTune: HotSpot, Concurrency, Lock&Waits
- GeantV compiled with gcc48
- Run on Intel i7 core
- Normal mode. Default settings ($N_{\text{threads}}=4$, $N_{\text{events}}=100$, $N_{\text{buffered}}=10$)

⤴	Elapsed Time: 47.172s	📄
	<u>Total Thread Count:</u>	29
	<u>Paused Time:</u>	9.952s
⤴	CPU Time: 144.995s	
	<u>Spin Time:</u>	2.892s
	<u>Overhead Time:</u>	0s
⤴	Effective Time: 142.104s	
	<u>Idle:</u>	0.010s
	<u>Poor:</u>	0.635s
	<u>Ok:</u>	13.386s
	<u>Ideal:</u>	128.072s
	<u>Over:</u>	0s

HotSpots

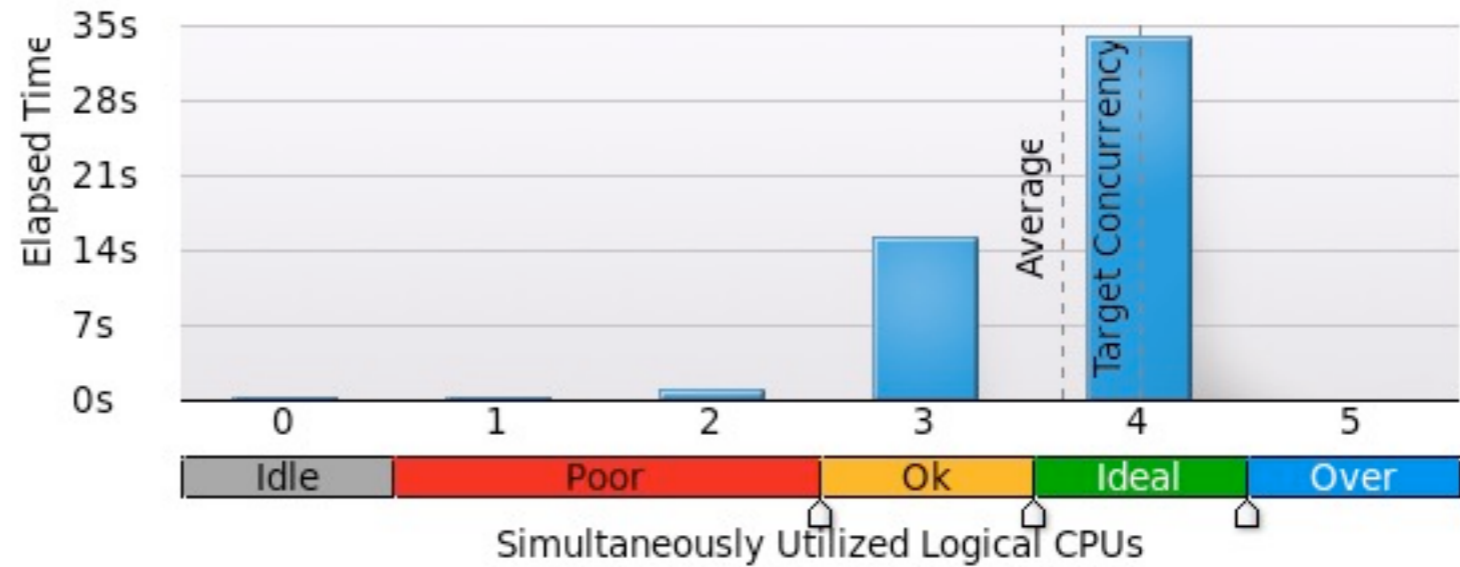
TMath::Log in energy look-up table bin calculation: use approximation instead

called by AddTracks/
AddTrackSync: known issue,
work on-going

<u>Function</u>	<u>CPU Time</u> ⓘ
log	28.038s
memcpy	11.648s
GeantTrack_v::AddTrackSync	10.457s
GeantTrack_v::AddTracks	10.455s
TTabPhysMgr::SampleFinalStates	6.560s
[Others]	77.837s

Concurrency info

- Time the specific number of CPUs were running simultaneously
- Detailed info on threads, functions and call stacks



Thread / Function / Call Stack	CPU Time by Thread Concurrency					Ov.. and..	Wait Time by Thread Concurrency				
	Idle	Poor	Ok	Ideal	Over		Idle	Poor	Ok	Ideal	Over
‣TThread::Function (TID: 13361)	43.821s					0.603s	5.624s				
‣TThread::Function (TID: 13363)	43.590s					0.480s	5.823s				
‣TThread::Function (TID: 13362)	43.588s					0.624s	5.862s				
‣TThread::Function (TID: 13364)	43.500s					0.588s	5.927s				
‣TThread::Function (TID: 13365)	11.780s					1.368s	41.262s				
‣TThread::Function (TID: 13366)	0.160s					0.080s	50.659s				

TRANSPORT

GARBAGE COLLECTOR

SCHEDULER

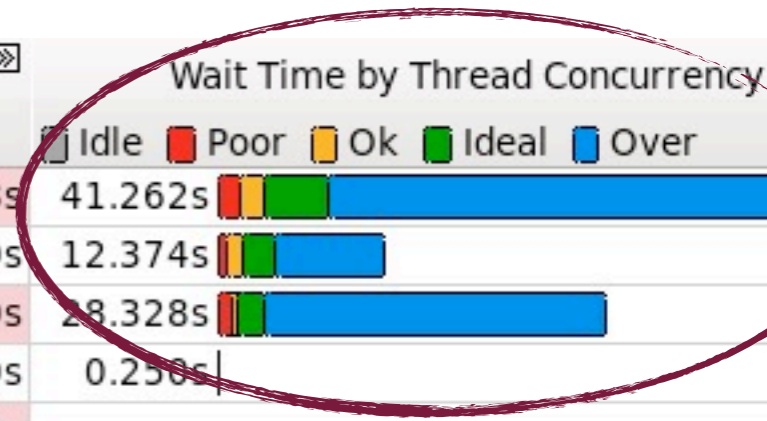
Transport Thread:

Thread / Function / Call Stack	CPU Time by Thread Concurrency	Over and..	Wait Time by Thread Concurrency
	Idle Poor Ok Ideal Over		Idle Poor Ok Ideal Over
▼TThread::Function (TID: 13361)	43.821s	0.603s	5.624s
▷log	7.111s	0s	
▷WorkloadManager::TransportTracks	5.408s	0s	5.622s
▷GeantTrack_v::AddTracks	2.893s	0s	
▷GeantTrack_v::AddTrackSync	2.442s	0s	
▷memcpy	2.254s	0s	
▷std::condition_variable::notify_one	1.963s	0.155s	
▷TTabPhysMgr::SampleFinalStates	1.640s	0s	
▷GeantTrack_v::PropagateInVolumeSingle	1.549s	0s	
▷GeantTrack_v::NavFindNextBoundaryAndStep	1.415s	0s	
▷TMXsec::Range	1.345s	0s	

Scheduler Thread:

Thread / Function / Call Stack	CPU Time by Thread Concurrency	Over and..	Wait Time by Thread Concurrency
	Idle Poor Ok Ideal Over		Idle Poor Ok Ideal Over
▼TThread::Function (TID: 13365)	11.780s	1.368s	41.262s
▷WorkloadManager::MainScheduler	5.641s	0s	12.374s
▷std::condition_variable::wait	3.022s	0.760s	28.328s
▷TUnixSystem::GetProcInfo	0.490s	0s	0.250s
▷std::condition_variable::notify_one	0.460s	0.100s	
▷TThread::Function	0.410s	0s	
▷_L_unlock_657	0.338s	0.338s	
▷_fopen_internal	0.270s	0s	
▷fgets	0.270s	0s	
▷TString::Gets	0.240s	0s	0.310s
▷_L_lock_854	0.080s	0.080s	

WAIT TIME



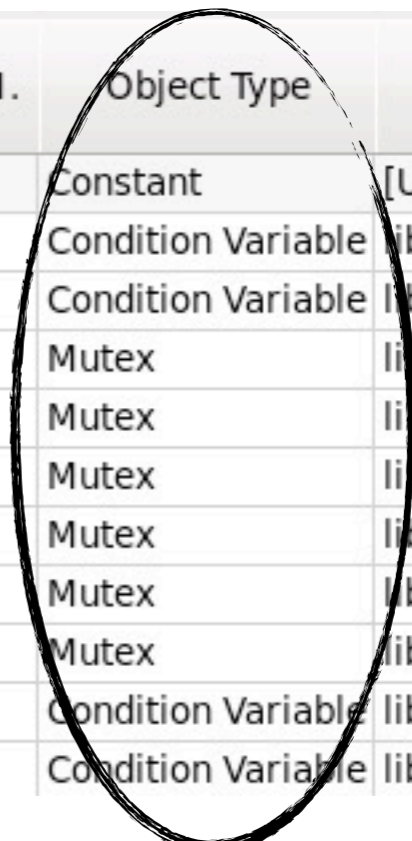
Wait time

Total: 165.992s

Sync Object	Wait Time	Wait Count
Signal	50.827s	1
Condition Variable 0xc6521337	50.659s	13,199
Mutex 0x5c1ab4b8	35.600s	727,565
Condition Variable 0xd30e0c72	28.328s	430,715
Stream 0xcf168bf9	0.310s	12,636
[Others]	0.268s	13,277

Sync Object / Thread / Function / Call Stack	Wait Time by Thread Concurrency	Wait Count	Spin Time	M.	Object Type	Object Creation Modu
	Idle Poor Ok Ideal Over 					
▷ Signal	50.827s	1	0s		Constant	[Unknown]![Unknown]
▽ Condition Variable 0xc6521337	50.659s	13,199	0.070s		Condition Variable	libstdc++.so.6.0.18!std::co
▷ TThread::Function (TID: 13366)	50.659s	13,199	0.070s		Condition Variable	libstdc++.so.6.0.18!std::co
▽ Mutex 0x5c1ab4b8	35.600s	727,565	0.476s		Mutex	libGeant_v.so!WorkloadMan
▷ TThread::Function (TID: 13365)	12.374s	170,529	0.090s		Mutex	libGeant_v.so!WorkloadMan
▷ TThread::Function (TID: 13364)	5.926s	139,604	0.090s		Mutex	libGeant_v.so!WorkloadMan
▷ TThread::Function (TID: 13362)	5.857s	139,634	0.106s		Mutex	libGeant_v.so!WorkloadMan
▷ TThread::Function (TID: 13363)	5.821s	139,399	0.100s		Mutex	libGeant_v.so!WorkloadMan
▷ TThread::Function (TID: 13361)	5.622s	138,399	0.090s		Mutex	libGeant_v.so!WorkloadMan
▽ Condition Variable 0xd30e0c72	28.328s	430,715	0.750s		Condition Variable	libstdc++.so.6.0.18!std::co
▷ TThread::Function (TID: 13365)	28.328s	430,715	0.750s		Condition Variable	libstdc++.so.6.0.18!std::co

↑ SCHEDULER ↓ TRANSPORT



Next

- Keep “studying VTune”!
- Continue study changing parameters and configuration
 - Run runCMS.C
- Use info to optimize code:
 - Maximize transport thread concurrency while reducing wait time
 - Reduce hotspots time