Threading the application LAB # 2 (Using Thread Checker)

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1. Compiling and running PrimeOpenMP.exe

- a. View the changes made in PrimeOpenMP.cpp Visual studio.NET. The statement "#pragma omp parallel for" in FindPrime() is used to create a parallel region.
- b. Compile the PrimeOpenMP.cpp by bld.bat in the Intel C++ compiler command line environment.

c. Run the using command "PrimeOpenMP.exe 1 1000000".

Intel(R) C++ Compiler 9.0.022 build environment for 32-bit applications
C:\ThreadingClassIDF\PrimeOpenMP>bld.bat
C:\ThreadingClassIDF\PrimeOpenMP>icl /O2 /nologo /I//include -D WIN32 /W3 Zi /Qopenmp /Qoption,link,/fixed:no PrimeOpenMP.cpp PrimeOpenMP.cpp PrimeOpenMP.cpp(106) : (col. 1) remark: OpenMP DEFINED LOOP WAS PARALLELIZED.
C:\ThreadingClassIDF\PrimeOpenMP>PrimeOpenMP 1 1000000 100%
78282 primes found between 1 and 1000000 in 2.03 secs
C:\ThreadingClassIDF\PrimeOpenMP>PrimeOpenMP 1 1000000 100%
78153 primes found between 1 and 1000000 in 2.05 secs
C:\ThreadingClassIDF\PrimeOpenMP>PrimeOpenMP 1 1000000 100%
77905 primes found between 1 and 1000000 in 2.03 secs
C:\ThreadingClassIDF\PrimeOpenMP>

We are getting different result now.

- 2. Analyze the PrimeOpenMP.exe for threading errors using ThreadChecker and fixed the programming errors.
 - a. Create a new activity in VTune and Select "Advance Activity Configuration"

New Activi	ity				? 🔀
Select one of	of the following to help you cre	ate an Activ	ity.		ОК
C <u>a</u> tegory:	Analyzer Projects	-	Manually configure an Activity using the Activity Configuration	~	Cancel
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🖄 Counter	Monitor Wizard		application and modules you wish to analyze, change the default configuration, and run		
- Call Gra	ph Wizard		the Activity to collect performance data.		
ar Advanc	ed Activity Configuration				
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2				10001	

b. Select "Intel Thread Checker" as data collector

ata Collectors: Intel(R) Thread Checker	New	Application/M	Iodule Profil	es:	New
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ld "New" application/module	profiles to define th	e applications/m	odules that	you wish to) launch/profile

c. Click "new" button for selecting Application/module profile and select the entries as provided below

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Application to Launch	i			
C:\ThreadingClassID	F\PrimeOpenMP\	PrimeOpenMP.e	xe	
Add to Modules of	of Interest List			
Working directory:				
C:\ThreadingClassID	F\PrimeOpenMP\	1		
Command line argum	ents:			
1 1000000				Ad <u>v</u> anced
System on which to launch application:	<localhost> note application:</localhost>		•	
Add to Modules of	ıf Interest List			
Modules of Interest				
Files:				<u> </u>
C:\ThreadingClassIC)F\PrimeOpenMP\	PrimeOperIMP.e	xe	
	ОК	Cancel	Appl	y Help

- d. Click OK
- e. Click OK again in "Advance Activity configuration".

f. Run the activity

X (Tune(TM) Performance Environment	
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朱 初 4	Run Activity
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- g. The view shows the errors in the application:

h. Select the particular error and click in source view to locate the statement in the source causing the

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VTPoinci3	Memory units of Linky	own al "PrinsEpenMP opp" 110 conflicts with a peor me	nery wills of Unknown at "Perro	OpenNP opp" \$10 (output dependence) • •
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49 Activity2(Call Graph) 49 Activity3		8 8 4 4 A V 6 6 6	= 3 · 1 🕄 💷 1	
- 06.20 PM. 2005 Se	Address Line 0	Source	Address Line 0	Source
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	118	int start, and;	118	int start, and;
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	Uragnostios E Stack Traces	Source View		

- i. Fix all the error using "#pragram omp Crictical section (lockname)". The changed program is available in PrimeOpenMPSolution-1.cpp.
- 3. Rebuild the application and run.

a.Compile the PrimeOpenMPSolution-1.cpp by bld1.bat in the Intel C++ compiler command line environment.

b.Run the using command "PrimeOpenMPSolution-1.exe 1 1000000"

📾 Intel(R) C++ Compiler 9.0.022 build environment for 32-bit applications				
C:\ThreadingClassIDF\PrimeOpenMP>bld1.bat				
C:\ThreadingClassIDF\PrimeOpenMP>icl /O2 /nologo /I//include -D WIN32 /W3 Zi /Qopenmp /Qoption,link,/fixed:no PrimeOpenMPSolution-1.cpp				
PrimeOpenMPSolution-1.cpp PrimeOpenMPSolution-1.cpp<105> : <col. 1=""> remark: OpenMP DEFINED LOOP WAS PARAI ELIZED.</col.>				
C:\ThreadingClassIDF\PrimeOpenMP>PrimeOpenMPSolution-1.exe 1 1000000 100%				
78498 primes found between 1 and 1000000 in 2.08 secs				
C:\ThreadingClassIDF\PrimeOpenMP>PrimeOpenMPSolution-1.exe 1 1000000 100%				
78498 primes found between 1 and 1000000 in 2.09 secs				
C:\ThreadingClassIDF\PrimeOpenMP>PrimeOpenMPSolution-1.exe 1 1000000 100%				
78498 primes found between 1 and 1000000 in 2.06 secs				
C:\ThreadingClassIDF\PrimeOpenMP>_				

- 4. Again create an activity, analyze the application and check that there are no errors.
- 5. Record the number of primes found
- 6. Record the run time
- 7. Calculate the scaling factor achieved
- 8. Compare it with theoretical scaling.