Lab Notes Template

2014

Projects & Collaborations

Alice Smith joint work on software on low power platforms[1]

Bob Jones joint work on novel concurrency primitives

[1] names and ideas changd to protect the innocent

Someday / Maybe

- Reimplement the ideas from the paper *Getting Reference Counting Back in the Ring* [**?**]

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10 June 2014

The (very fast) OCaml to Javascript compiler described in [**?**][2] takes the unusual approach of compiling OCaml *bytecode* to Javascript, rather than performing a source-to-source translation.

[2] http://ocsigen.org/js_of_ocaml/

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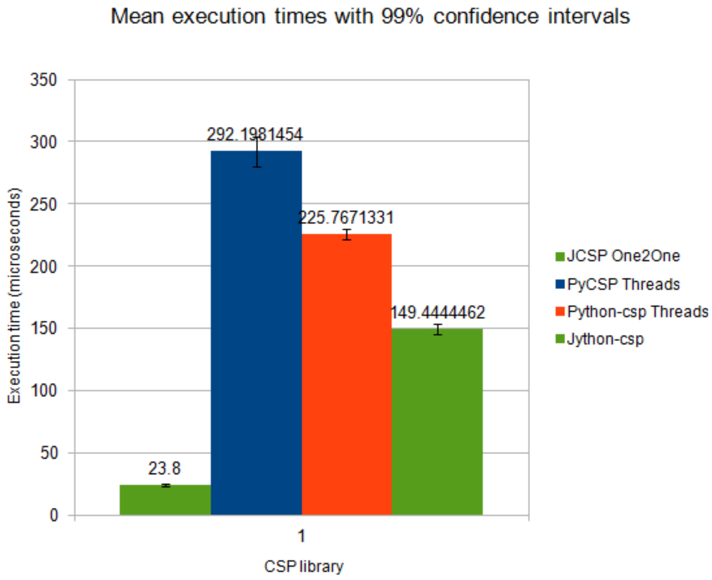
9 June 2014

Poor benchmark results. Ideas for improvement are listed in the issue tracker in the repository.



6 June 2014

Back from vacation.

Student project idea improve `https://github.com/snim2/Terminus` by adding new BASH commands.

Size of data sets for the ngram paper are shown in Table 1.

May 30 2014

Useful datasets: `http://rs.io/2014/05/29/list-of-data-sets.html` In particular Mozilla have released a defect tracking dataset on GitHub[3][**?**].

Google NGram dataset can be found in Amazon S3[4].

[3] `https://github.com/ansymo/msr2013-bug_dataset`

[4] `http://aws.amazon.com/datasets/8172056142375670`

Jan 20 2013

N.B.: The following is a sample entry from Mikhail Klassen's research diary. It is intended to be illustrative of how WriteLaTeX can be used the keep track of your research progress. Some names have been removed from this document for privacy.

Table 1: Data sizes in Google ngram data

Data	Rows	Compressed Size (GB)
English		
1 gram	472,764,897	4.8
2 gram	6,626,604,215	65.6
3 gram	23,260,642,968	218.1
4 gram	32,262,967,656	293.5
5 gram	24,492,478,978	221.5
Totals	87,115,458,714	803.5
English One Million		
1 gram	261,823,186	2.6
2 gram	3,383,379,445	32.1
3 gram	10,565,828,499	94.8
4 gram	12,987,703,773	113.1
5 gram	8,747,884,729	75.8
Totals	35,946,619,632	318.4
American English		
1 gram	291,639,822	3
2 gram	3,923,370,881	38.3
3 gram	12,368,376,963	113.9
4 gram	15,118,570,841	135
5 gram	10,175,161,944	90.2
Totals	41,877,120,451	380.4
British English		
1 gram	188,660,459	1.9
2 gram	2,000,106,933	19.1
3 gram	5,186,054,851	46.8
4 gram	5,325,077,699	46.6
5 gram	3,044,234,000	26.4
Totals	15,744,133,942	140.8
English Fiction		
1 gram	191,545,012	2
2 gram	2,516,249,717	24.3
3 gram	7,444,565,856	68
4 gram	8,913,702,898	79.1
5 gram	6,282,045,487	55.5
Totals	25,348,108,970	228.9
Total without 1M	170,084,822,077	1553.6
Total without 1M		1.53TB
Total	206,031,441,709	1872
Total		1.848TB

Initial conditions for the turbulent molecular cloud run

Inner radius

The density profile follows an $r^{-3/2}$ power law. To avoid a singularity at the center, an interpolation is done over a radius. This inner radius is defined in the parameter file. It should follow the prescription of a singular isothermal sphere (see Binney & Tremaine p.305), which is also the definition of the King radius:

$$r_0 \equiv \sqrt{\frac{9\sigma^2}{4\pi G\rho_0}} \tag{1}$$

where σ is the velocity dispersion and could be estimated as $\sigma = \mathcal{M}c_s$, where $c_s = \sqrt{\gamma P/\rho} = \sqrt{\gamma k_B T/\mu}$ is the sound speed.

The isothermal sound speed in our simulation was estimated

$$c_s = \sqrt{\frac{k_b T}{\mu m_p}} \tag{2}$$

I'm unsure why a factor of γ was not included. For 30 K, this gives a sound speed of about 34000 cm/s or 0.34 km/s. At a Mach number of 5, this gives a supersonic dispersion of σ = 1.7 km/s

This gives an inner radius of $r_0 \approx$ 1.595e17.

Rotation

Set the same ratio of rotational to gravitational energy β as in Peters et al. 2010a. According to Goodman et al. (1993), this is given by (see equation 6):

$$\beta = \frac{1}{4\pi G\rho_0}\omega^2 \tag{3}$$

In practice we can probably use the central density ρ_c instead of determining an average density ρ_0. Looking at the numbers from other simulations, we could use an ω of 1.3e-14.

The link to the Goodman et al. (1993) paper:
`http://adsabs.harvard.edu/cgi-bin/bib_query?1993ApJ...406..528G`

We want to complete our simulation with a similar β to check if disks form in the turbulent environment.

The ω necessary to produce a $\beta = 0.05$ would be

$$\omega = \sqrt{4\pi G\rho_0\beta} \approx 7.15 \times 10^{-13} \tag{4}$$

using $\rho_0 = \rho_c = 1.22 \times 10^{-17}$.

After testing this, however, I found that the rotation was much too fast. Perhaps using $\rho_0 = \rho_c$ was not a very good assumption at all, since ρ_c is orders of magnitude larger than the average. I wrote a little Python script that sums up all the mass inside the outer radius and divides it by the total volume, defined by the outer radius. In this case, for an outer radius of 5.97402×10^{18} cm and about 1000 $M_{\odot}$, we get an average density of 2.96415×10^{-21} g/cm^3, which gives us $\omega = 1.114 \times 10^{-14}$.