Re: computational amateur astronomy?

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- *From*: pausch@xxxxxxx (Paul Schlyter)

- *Date*: Wed, 29 Jun 2005 21:14:32 GMT

In article <42c2f0d6$1@xxxxxxxxxxxxxxxxxxxxx>,
Jonathan Bartlett <johnnyb@xxxxxxxxxx> wrote:

> I've been thinking about getting started in amateur astronomy. However,
> I'm from the computer science area, and as such I love
> computing/calculation. I've been disappointed because most amateur
> astronomy books just focus on looking at things. I would also enjoy
> calculating things. Is it possible with amateur equipment to make any
> sort of meaningful calculations? Distances, speeds, anything? I
> imagine so, since Kepler and Newton probably had less equipment and was
> able to determine the laws of planetary motion. Anyway, I was curious
> if anyone knew of a good beginner book or website that shows how to
> re−make such classic calculations or do any other kind of computational
> astronomy.

Modern personal computers are very capable machines! So you can definitely
do meaningful calculations with them −− if you either have the patience
to write your own software to do the calculations you're interested in,
or to locate some software which does the calculation for you.

I started myself with astronomical computing on personal computers around
1980 (actually a few years earlier if you include programmable calculators).
Back in 1980 things were very different. Personal computers did cost an
arm and a leg almost, and yet they could perform almost nothing compared
to today's cheap and fast computers. Yet they were possible to use. As
an example, I wrote a program back in 1983 which performed one very specific
task: it computes sun/moon−rise/set and twilight for each day of a calendar
year, as seen from one location of your choice. The execution time of
that program has steadily decreased as follows:

1983: 1 hour (2 MHz Z−80, Apple II SoftCard CP/M)
1984: 20 min (6 MHz Z−80, Apple II Appli−Card CP/M)
1986: 10 min (5 MHz 8088+8087, MS−DOS)
1988: 1.5 min (16 MHz 80386+387, MS−DOS)
1994: 20 sec (66 MHz 80486, MS−DOS)
1998: 3 sec (300 MHz Pentium−II, Win−98)
2002: 0.5 sec (1.8 GHz Pentium−IV, Win−XP)

Back then it was also hard to find information on how to compute

these things − one had to gain access to a library with professional
astronomical journals, plus the time to locate the interesting articles.
Then a guy named Jean Meeus in Belgium started to write articles for
his association "Vereniging der Steerrenkunde" in Belgium. A number
of these artices was collected in a book. Willmann−Bell in the US
got interested in them and has since then published a number of
books by Jean Meeus −− they're all highly recommended for anyone
seriously interested in astronomical computing.

Finally, some links to get you started:

My own web pages:
http://stjarnhimlen.se/comp/ppcomp.html (note the links at the end!)
http://stjarnhimlen.se/comp/tutorial.html

Willmann−Bell:
http://www.willbell.com/math/index.htm

Explanatory Supplement to the Astronomical Almanac −− not a beginner's
book, but a definite reference if you get seriously interested in this.
http://tinyurl.com/acea6

Astronomical Almanac − published yearly. Get it for at least one
year, and use as a reference against which to compare your own
calculations.
http://tinyurl.com/8vn6g

Happy computing!

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- ***References***:
    - ***computational amateur astronomy?***
        - *From:* Jonathan Bartlett

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