

The Embedded Muse 115

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Editor's Notes

The Muse has been on hiatus for the summer months, but is now active again. Thanks for everyone's emails over the last few months!

Backups

Hurricane Katrina has wreaked havoc all along the US Gulf coast, and my sympathies go out to any of you affected by this tremendous tragedy. My son was in college in New Orleans but managed to get away in time. The Red Cross is accepting donations (<https://www.redcross.org/donate/donation-form.asp>).

According to the NY Times (http://nytimes.com/cnet/CNET_2100-1011_3-5845894.html) the devastation made companies in other areas aware of the potential for disaster if their on-site data and backups were submerged under 10 feet of water. There's a spike in business for vendors of off-site data storage this week.

We developers should be wary, too. Our work products are data, the ones and zeroes that represent firmware or CAD designs. One glitch, mistake, or natural disaster could wipe out the company. I see these problems happen all the time.

A few years ago the FAA announced they had lost the source code to all of the software that controlled air traffic between Chicago and the regional airports. The code all lived on one developer's machine, one angry person who quit and deleted it all. He did, however,

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install it on his home computer, encrypted. The FBI spent 6 months reverse engineering the encryption key to get their code back.

Appalling? You bet. But these incidents are far from rare.

Before even thinking about building any sort of software, install and use a version control system (VCS). Building even the smallest project without a VCS is a waste of time and an exercise in futility.

Without a VCS, a failure of any engineer's computer will mean you lose code, since it's all inevitably scattered around amongst the development team.

The version control database – the central repository of all of your valuable software – lives on a single server. Daily backups of that machine, stored offsite, insures your business's survival despite almost any calamity. Offsite storage is best done in a place a thousand miles from the main office in case a hurricane or earthquake takes out an entire region.

Be sure the central server is getting backed up regularly... and that the backups are valid. One engineer told me they did daily backups, rotating through a 6 week supply of tapes. Something failed in the hardware; for 3 months the tape drive wrote nothing but zeroes. Only luck kept them from losing the business.

Version control systems range in price from free (like the GNU products) to expensive, but even the expensive ones are cheap. See <http://better-scm.berlios.de/comparison/comparison.html> for a comprehensive list of products.

There's no excuse for losing data.

Productivity Vs Process

Everyone knows that highly reliable software is intrinsically expensive... much more so than normal commercial-grade programs, right?

Maybe not.

The Capability Maturity Model is either reviled or loved. It layers lots of heavyweight process on the development team in an effort to build more reliable code. Yet companies that aggressively pursue the CMM gain something like 33% productivity per year.

O. Benediktsson (*Safety Critical Software and Development Productivity*, conference proceedings, Second World Conference on Software Quality, Sept 2000) looked at the

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cost to build software at different levels of process maturity. They created the odd terms “VI” and “CI.” “VI” means Verifiability Index. It’s a measure of the cost of a failure, and is defined as follows:

- Nominal – Moderate, easily recoverable losses
- VI1 – High financial loss
- VI2 – Very high financial loss
- VI3 – Human life at risk

“CI” is the Capability Index and is roughly equivalent to CMM levels 1 to 4.

The relative cost to build a product, they claim, is a function of the team’s process maturity and the product’s reliability, as follows:

	Nominal	VI1	VI2	VI3
Nominal	1.00	1.15	1.28	1.70
CI1	0.94	1.08	1.20	1.60
CI2	0.74	0.85	0.95	1.26
CI3	0.56	0.65	0.72	0.95

Read down the diagonal from “Nominal, Nominal” to “VI3, CI3.” We can build safety critical software for the same cost as the usual shoddy stuff if we increase our process maturity!

Or, we can build the usual crud faster and cheaper by improving our processes.

Obviously, any process can be, and often is, subverted. I visited a CMM5 organization not long ago that doesn’t use code inspections, though these are required at level 3. Somehow they’d gotten certified yet this one team, at least, is clueless about the requirements of the CMM.

There are a zillion different methods – processes – for building software. Most of the embedded world uses little or none, whether it’s a monstrous heavyweight one like the CMM or any of the Agile methods.

And that’s a darn shame, considering the data shown above.

Jobs!

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Let me know if you're hiring firmware or embedded designers. I'll continue to run notices for embedded developers as long as the job situation stays in the dumper. No recruiters please.

DISTek in Iowa has need for a good automotive-type hardware engineer and a few embedded developers. Details are available on www.distek.com.

Inhand Electronics needs Mid & Senior Embedded Software Engineers. Must have 5 to 8+ years of experience with embedded kernel and device driver development. Strong experience developing real-time multithreaded software, and C and C++ programming and debugging skills are required. Experience designing, writing, and testing Windows CE and/or Linux device drivers are highly preferred. Intel XScale and ARM programming architectures/assembly language is also preferred. Experience with Win32 API, JTAG-based software emulators, and debugging assembly language code are also preferred. Bachelor degree in Electrical Engineering or Computer Science is required, Master degree in EE or CS is a plus. Contact: Mike Bigney
Inhand Electronics
mbigney@inhandelectronics.com
(240)558-2014 x211

Dynon Avionics is seeking an embedded software engineer to contribute to the development of our exciting product line of general aviation instruments. Dynon is a small company (<20) where each person makes a large impact. The position requires someone who can work with people from various disciplines to produce a product from concept to market. The ideal candidate will have experience in bare-metal embedded C code on an ARM processor platform but a variety of backgrounds will be considered. Desired Skills/Experience:

- * EE/CE/CS bachelors degree
- * 3-6 years experience
- * Experience with embedded C software development
- * Real Time Embedded operating systems concepts and low level programming
- * Knowledge of embedded digital hardware architectures
- * General knowledge of communication protocols
- * Experience with ARM processor development
- * High energy level and work ethic

Send resume to employment@dynonavionics.com

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Joke for the Week

Check out <http://www.csoonline.com/read/080105/debrief.html>

Especially appropriate is their definition of “Backup.” It’s a process you don't need until you don't do it.

About The Embedded Muse

The Embedded Muse is an occasional newsletter sent via email by Jack Ganssle. Send complaints, comments, and contributions to him at jack@ganssle.com.

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The Embedded Muse is supported by The Ganssle Group, whose mission is to help embedded folks get better products to market faster. We offer seminars at your site offering hard-hitting ideas - and action - you can take now to ***improve firmware quality and decrease development time***. Contact us at info@ganssle.com for more information.

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