Basic Development Management

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1981 - 1993 (freelance)

1981 - 1982	TSR Hobbies, Inc.
1983	Graduated UCSC, BACS
1983	*Picnic Paranoia* port from Atari to C64
1984 - 1985	*Mail Order Monsters* on C64
1985 - 1986	*World Tour Golf* on PC, C64, Amiga
1987 - 1988	unpublished project
1989 - 1991	*Centurion* on PC, Amiga, Genesis
1991 - 1993	*Champions* (unpublished)

1993 - 1994 (at EA)

Bards Tale 3 IBM, Bloodliners Sega, DPaint IIe v 2.4, Jordan Adventure Sega, La Russa '94 Sega, La Russa II 3DO, Madden 3DO, Madden '95 3DO, MULE Sega, Mutant Hockey League Sega, Normy Sega, Ring of Doom Sega, Savage Heroes Sega, Urban Strike Sega, Perfect 3DO, Psychic Detective 3DO, Letters 3DO, 80 Days 3DO, Scooter 3DO, Numbers 3DO, Madden '94 Sega, EA Sports Boxing, Euro Tour Sega, Jordan Adventure SNES, Madden '94 Sega CD, Madden '95 SNES, NHL '95 SNES, Road Rash III Sega, Tennis Sega, Tony La Russa 3DO, Walsh II Sega, 3DO Loader, FMX, XFighters IBM, Madden '95 Sega, F117 Nightstorm, Jordan In Flight 3DO, Soundwave 3DO, NHL '95 3DO.

IN THE BEGINNING...

WAS THE HOME COMPUTER

 Apple II 1977+	1.0 Mhz 6502 4K - 48K RAM 280 x 192, 6 colors 143K floppy	$1300 $2600 w/48K
 Atari 800 1979+	1.8 Mhz 6502 8K - 48K RAM 320 x 192, 2 colors 160 x 96, 128 colors 88K floppy	$1000 $2000 w/floppy & 48K
 C64 1982+	1.0 Mhz 6510 64K RAM 320 x 200, 16 colors 160K floppy	$600 $1000 w/floppy

Here are some multiplication and division routines to use for larger integers. I haven't taken any time to document the code much but it should be fairly straightforward and self explanatory. These are routines that I expanded from the 6502 Software Design book by Leo J. Scanlon. Anyone may contact me for questions or comments at greg@ntown.com.

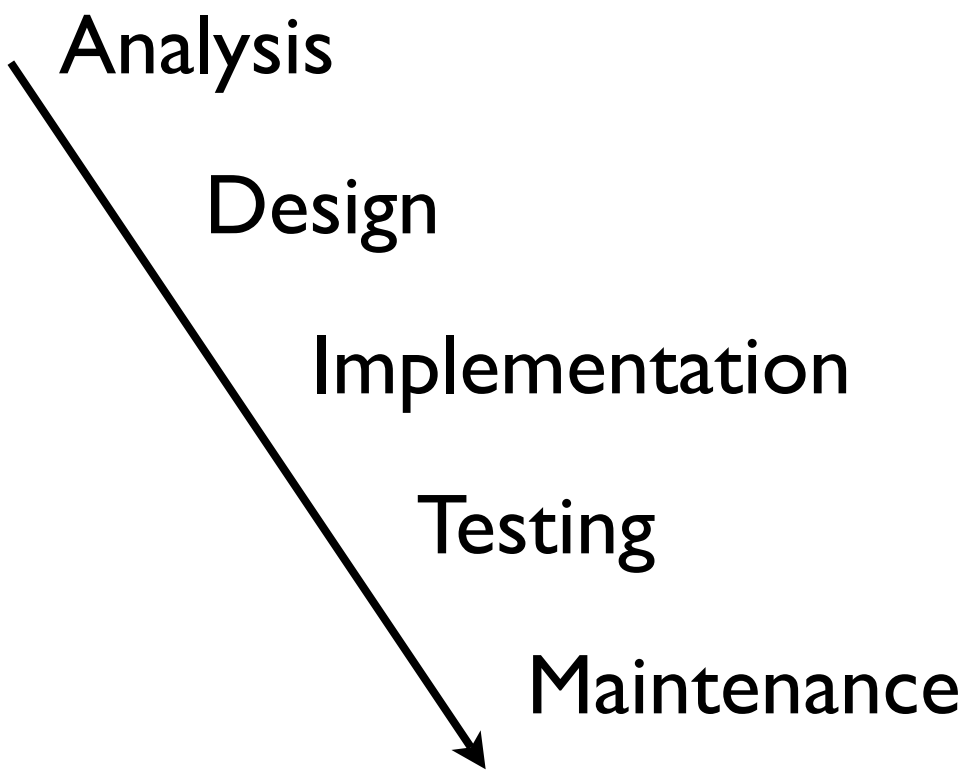
```
;32 bit multiply with 64 bit product

MULTIPLY:  lda     #$00
           sta     PROD+4   ;Clear upper half of
           sta     PROD+5   ;product
           sta     PROD+6
           sta     PROD+7
           ldx     #$20     ;Set binary count to 32
SHIFT_R:   lsr     MULR+3   ;Shift multiplyer right
           ror     MULR+2
           ror     MULR+1
           ror     MULR
           bcc     ROTATE_R ;Go rotate right if c = 0
           lda     PROD+4   ;Get upper half of product
           clc              ; and add multiplicand to
           adc     MULND    ; it
           sta     PROD+4
           lda     PROD+5
           adc     MULND+1
           sta     PROD+5
           lda     PROD+6
           adc     MULND+2
           sta     PROD+6
           lda     PROD+7
           adc     MULND+3
ROTATE_R:  ror     a        ;Rotate partial product
           sta     PROD+7   ; right
           ror     PROD+6
           ror     PROD+5
           ror     PROD+4
           ror     PROD+3
           ror     PROD+2
           ror     PROD+1
           ror     PROD
           dex              ;Decrement bit count and
           bne     SHIFT_R  ; loop until 32 bits are
           clc              ; done
           lda     MULXP1   ;Add dps and put sum in MULXP2
           adc     MULXP2
           sta     MULXP2
           rts
```

I Survived

21 Betas!

Waterfall Life Cycle



Orders of Magnitude: Hardware

6502 1-2 Mhz	5 8-bit registers (A, X, Y, P, S) 7 status bits in P $00-$FF zero page 16-bit address space 9000 transistors ~2 MB/s throughput
Pentium 3+ Ghz	8 8/16/32-bit registers (EAX, ECX, EDX, EBX, ESP, EBP, ESI, EDI) plus some... 14 status bits 32-bit address space 125 million transistors ~7 GB/s throughput (Athlon 64)
Cell ~4 Ghz	1 PPE processor (roughly equivalent to a Pentium) 8 SPE processors (128 registers, 256K local RAM each) 235 million transistors 25 GB/s + 77 GB/s throughput

Orders of Magnitude: Software

- 1985 (Mail Order Monsters): ~5,000 lines of 6502 ASM, ~25,000 of data
- 2003 (Acrobat): ~3,000,000 lines of C
- 2003 (Windows Server 2003): 50,000,000 LOC (according to Business Week)

19 Orders of Magnitude

- 3 in CPU speed (1 Mhz -> 1 Ghz)
- 3 in Display Size (1K chars -> 3M pixels)
- 5 in RAM Size (48K -> 1G)
- 5 in HD Size (88K -> 90G)
- 3 in project size (5000 LOC -> 3,000,000 LOC)

19 Orders of Magnitude

10,000,000,000,000,000,000

1,000,000 is million

1,000,000,000 is billion

1,000,000,000,000 is trillion

so that's 10 million trillion times!

Lesson 1

Know What You Want

Lesson 1, part 2

Is This Going To Get You What You Want?


U.S.69


Celebrity-Pictures-World.com

Software Engineering is a
programming discipline.

Software Development is a
management discipline.

Basic Software Development

- Imagine What You Want To Build
- Build What You Want

Basic Iterative Development

- Start with some existing software
- Repeat Until Done:
  - Imagine What You Want To Add
  - Add It

Devilish Details

Mariner 1 launch failed as the vehicle was destroyed by the Range Safety Officer 293 seconds after launch ... the Mariner 1 Post Flight Review Board determined that ***the omission of a hyphen in coded computer instructions in the data-editing program allowed transmission of incorrect guidance signals to the spacecraft***. During the periods the airborne beacon was inoperative the omission of the hyphen in the data-editing program caused the computer to incorrectly accept the sweep frequency of the ground receiver as it sought the vehicle beacon signal and combined this data with the tracking data sent to the remaining guidance computation.

http://nssdc.gsfc.nasa.gov/database/MasterCatalog?sc=MARIN1

Lesson 2

Software Development
is *an organized process*
for managing details.

The Short Version

Focus

2300 years of confusion?

We are what we think, having become what we thought. Clear thinking leads to Nirvana; a confused mind is a place of death. Clear thinkers do not die, the confused can never live. Planners make canals, archers shoot arrows, craftsmen fashion woodwork, the wise man molds himself.

from the Dhammapada

Lesson 3

“Clear Thinking Leads to Nirvana; a Confused Mind is a Place of Death”

The Long Version

Development Is Hard

The Long Version

- Time Management
- Process
- The “Holy Triangle”
- People Management
- Learning

Time Management

The Purpose of Time Management is to:

- Reduce Decisions
- Track Time

Two Lists

- Tasks To Do
- Tasks In Progress

Lesson 4

Keep Track of Your Time.

Know What to Do Next.

Process is Critical

- Process reduces decisions
- Process makes sure the right people make the decisions
- Process allows repetition and improvement
- Process is the difference between Engineering and Art

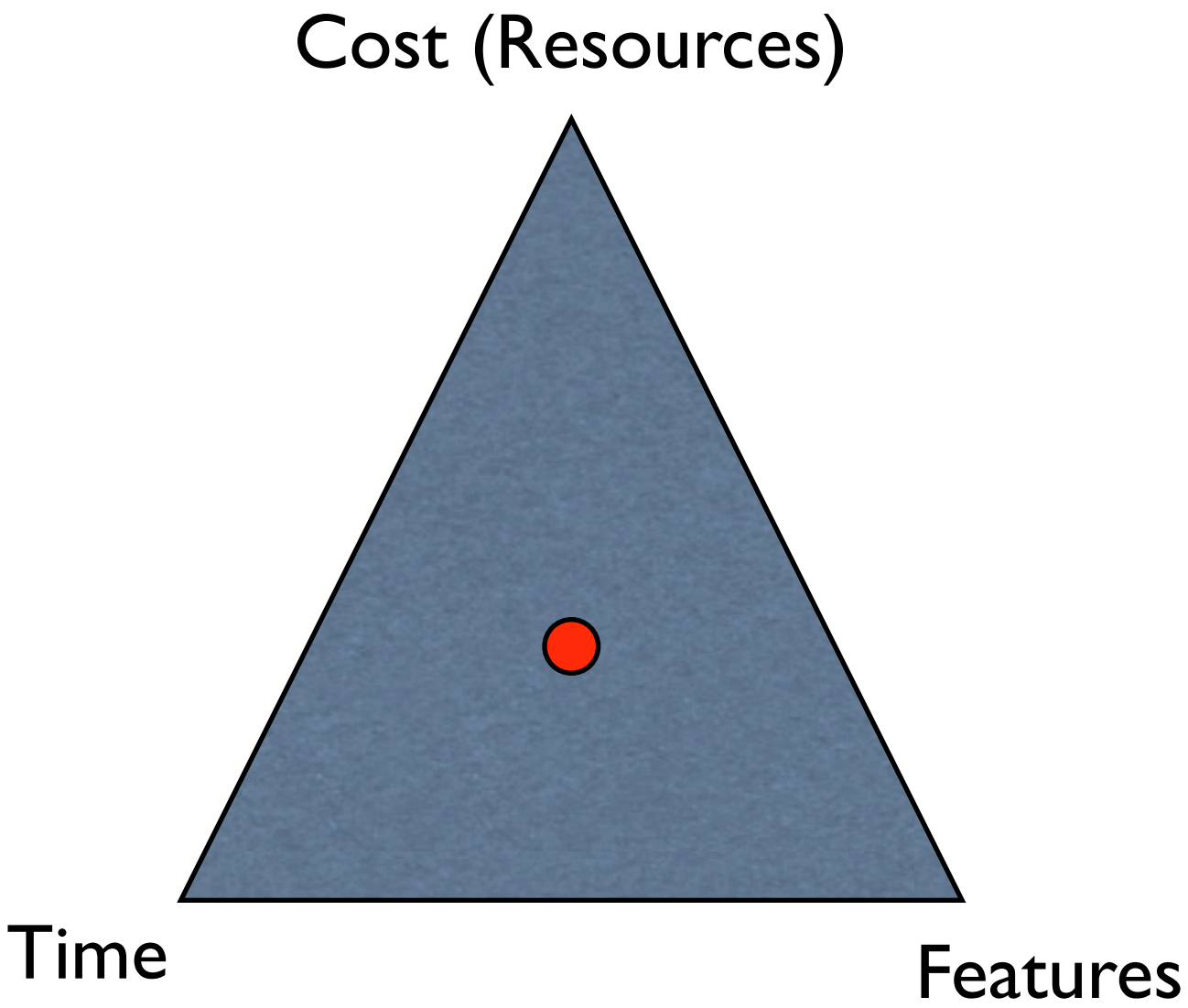
Lesson 5

Proper Process Does Not Reduce Creativity.

Example Process

- Product Concept (go to design)
- Product Design (go to TDR)
- Technical Design Review (go to Alpha)
- Development Milestones
- Alpha (go to ship)
- Beta
- Gold Master

The Holy Triangle



Lesson 6

Know the Holy Triangle and Keep Closely To It

People Management

- Working Environment
  - Distractions
- Equipment
- Support
- Rewards
- Hours & Crunch Mode

Avoid Distractions

- It takes 15 minutes to enter "flow" (*Peopleware*). Any significant interruption costs 15 minutes of productive work time.
- Use Offices or Headphones for noise
- Turn Phone Ringers off -- use voicemail
- Read Email at set times of day
- Avoid IM software as high priority

Lesson 7

Distractions Destroy Productivity

Lesson 8

Proper Equipment Enhances Productivity

Support & Rewards

- Often Ignored
- Military Support can represent 90% of personnel. Adobe accountants freaked when internal support (IT) costs hit were over 8%.
- Make sure you reward behavior you want.
- Money is not the only reward.
- Your good people can do basic math.

Hours & Crunch Mode

- ea_spouse, joe_straitiff (LiveJournal)
- IGDA Quality of Life Summit
  - 34% expect to leave the industry within 5 years. 50% expect to leave within 10 years.
  - Fewer than one lead developer in 10 has over 10 years of experience
- Crunch Mode is the elephant in the living room.

Hours & Crunch Mode

Crunch Mode is simply the long-term application of this idea:

If I can get X done in 8 hours,

Then I can get 2X done in 16 hours.

Hours & Crunch Mode

1908: Ernst Abbe publishes study showing reducing hours from 9 to 8 increased total daily output.

1909: Chapman publishes *Hours of Labour* showing long-term variations in productivity as a function of workday length.

1926: Ford adopts five day, 40 hour week.

Hours & Crunch Mode

Reasons We Use Crunch Mode:

- I Can't Measure Output
- It's Always Been This Way
- It Worked Last Time
- I Must Be Seen To Be Doing Everything Possible To Succeed
- Testosterone: The Original "Stupid Drug"

Hours & Crunch Mode

Lessons from the Literature re: Crunch Mode

- Productivity varies over the workday
- Productivity is hard to quantify for knowledge workers
- Five-day weeks of eight-hour days maximize long-term output
- At 60 hours/week, loss of productivity caused by working longer hours overwhelms extra hours worked within eight weeks.
- Continuous work reduces cognitive function 25% for every 24 hours. Multiple consecutive overnighters have a severe cumulative effect.
- Error rates climb with hours worked and especially with loss of sleep.

Metrics

- "You Can't Control What You Can't Measure"
  Lord Kelvin (paraphrased)
- Find some predictive value that can be obtained before project is completed.
- Common candidates:
  - Lines of Code (LOC)
  - Function Points (FP)
  - Models, Textures, Levels
- SEI's Personal Software Process (PSP)

Books

Peopleware and *Waltzing With Bears*, by Tom DeMarco & Tim Lister

Death March, by Edward Yourdon

The Mythical Man-Month, by Fred Brooks

1001 Ways to Reward Employees, by Bob Nelson

Code Complete, *Rapid Development*, and *Software Project Survival Guide*, by Steve McConnell

201 Principles of Software Development, by Alan Davis

Assessment and Control of Software Risks, by Capers Jones

The Inmates Are Running The Asylum, by Alan Cooper

Websites

IGDA: www.igda.org

GDC: www.gdconf.com

GamaSutra: www.gamasutra.com / www.gamedeveloper.com

Chris Crawford: www.erasamatazz.com

Hiring Technical People: www.jrothman.com/weblog/htpblogger.html

Managing Product Development: www.jrothman.com/weblog/blogger.html

ea_spouse: www.livejournal.com/users/ea_spouse

/. games: games.slashdot.org

Lesson 9

“Age & Treachery always overcomes Youth and Skill”

Waylon Jennings & Willie Nelson