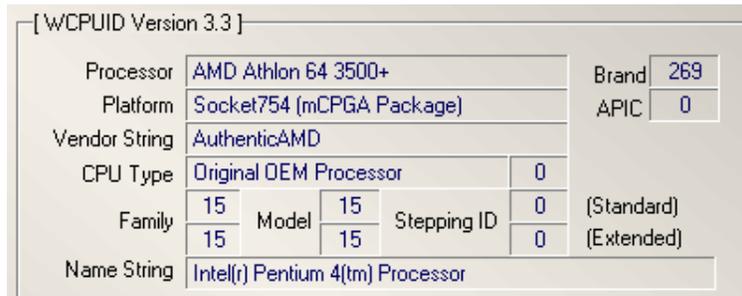


Playing With MSRs: AMD -> Pentium4

{ Written by f0dder }
{ f0dder (at) flork (dot) dk }
www.reteam.org -/- f0dder.has.it

(reference the attached amdp4_test.zip file bundled with this paper)



See anything wrong with this image?

I guess everybody are familiar with the "computer type" string under Windows' "system properties" - stuff like "AMD Athlon(tm) 64 Processor 3500+", right before it lists CPU speed and RAM size. This information is returned by the **CPUID** instruction, and should be a pretty failsafe way of determining your CPU, right? After all, the string CPUID returns is hardcoded in the processor?

Guess again.

A while ago, [Scali](#) stumbled upon a weird CPUID screenshot, showing a 4200+ processor as a 2200+. Let me quote Scali: *At first I thought it was a fake, because I assumed the string was immutable like with Intel. So a 4200+ must display 4200+. But then people claimed that it had to do with the bios... at first I didn't believe them, but eventually I decided to check AMD's docs on CPUID, and it included a whole bunch of crap about how you should program the string in the bios.*

Luckily, I had finished some code to allow ring3 applications to manipulate MSRs a month or so previously, so Scali could quickly hack together an app to test the "CPU renaming". And indeed, AMD processors do allow you to change the CPUID string. It's documented in [AMD techdoc 20734](#), and I've put a test package with screenshots below. Notice that the screenshots show the internal clock for my AMD64 3500+ as 1004MHz - this is because I've activated the Cool'n'Quiet powersaving mode.

Please note that the demonstration application manipulates **MSRs - Model Specific Registers**. This could potentially be dangerous on non-AMD systems, or even AMD systems not supporting this. The code needs ring0 access (administrator privileges on NT, ring0 hack on Win9x). **Running the code is at your OWN responsibility!**

Before Screenshot

The screenshot shows the WCPUID / CPU Status application window. The title bar reads "WCPUID / CPU Status". The menu bar includes "File", "Edit", "View", "Tweaks", and "Help". The toolbar contains various icons for file operations and a "Processor #1" dropdown menu. The main content area displays system information for an AMD Athlon 64 3500+ processor. A vertical green bar on the left side of the window contains the text "WCPUID" and "**** MHz".

[WCPUID Version 3.3]						
Processor	AMD Athlon 64 3500+				Brand	269
Platform	Socket754 (mCPGA Package)				APIC	0
Vendor String	AuthenticAMD					
CPU Type	Original OEM Processor					0
Family	15	Model	15	Stepping ID	0	(Standard)
	15		15		0	(Extended)
Name String	AMD Athlon(tm) 64 Processor 3500+					
Internal Clock	1004.62	MHz	System Clock	200.92	MHz	
System Bus	200.92	MHz	Multiplier	5.0		
L1 I-Cache	64 K	Byte	L2 Cache	512 K	Byte	
L1 D-Cache	64 K	Byte	L2 Speed	Full		
				1004.62	MHz	
MMX	Supported		MMX+	Supported		
SSE	Supported		3DNow!	Supported		
SSE2	Supported		3DNow!+	Supported		
SSE3	Not Supported					
Windows XP Version 5.1.2600 Service Pack 2						

Date/Time: 04/06/2005 22:56:23

Chipset: 10DE:005E.A3

VGA: 10DE:0141.A2

Memory: 1024 M Byte

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After Screenshot

The screenshot shows the WCPUID / CPU Status application window. The title bar reads "WCPUID / CPU Status". The menu bar includes "File", "Edit", "View", "Tweaks", and "Help". The toolbar contains various icons for file operations and a dropdown menu for "Processor #1".

The main content area displays system information for "Processor #1". It includes a table of processor details, a table of clock speeds, a table of cache sizes, and a table of supported instructions. The operating system is identified as "Windows XP Version 5.1.2600 Service Pack 2".

On the left side of the window, there is a vertical green bar with the text "WCPUID" and "***** MHz".

[WCPUID Version 3.3]						
Processor	AMD Athlon 64 3500+				Brand	269
Platform	Socket754 (mCPGA Package)				APIC	0
Vendor String	AuthenticAMD					
CPU Type	Original OEM Processor					0
Family	15	Model	15	Stepping ID	0	(Standard)
	15		15		0	(Extended)
Name String	Intel(r) Pentium 4(tm) Processor					
Internal Clock	1004.63	MHz	System Clock	200.93	MHz	
System Bus	200.93	MHz	Multiplier	5.0		
L1 I-Cache	64 K	Byte	L2 Cache	512 K	Byte	
L1 D-Cache	64 K	Byte	L2 Speed	Full		
				1004.63	MHz	
MMX	Supported		MMX+	Supported		
SSE	Supported		3DNow!	Supported		
SSE2	Supported		3DNow!+	Supported		
SSE3	Not Supported					
Windows XP Version 5.1.2600 Service Pack 2						

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Have fun :)