

High performance Asterisk

Presentation for Astricon 2008

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High performance Asterisk?

On a single Server doing:

-  Predictive dialing
-  Message blasting with included...
-  Text to speech for each connected call
-  IVR (Interactive Voice Response)
-  120.000 calls per hour.
-  Using AGI & AMI

What did we need for that?

-  ViciDial
-  Dual Quad core Server
-  16 T1 lines (or a T3 with a t3mux)
-  Two Sangoma A108D
-  Asterisk 1.2 with ViciDial patches
-  OpenSuSE with custom Kernel
-  Separate Database Server

What Problems did we run into?

- ☎ Asterisk design
- ☎ Performance (CPU Load, Process Load)
- ☎ IO Bandwidth
- ☎ Zaptel
- ☎ Kernel (interrupts)
- ☎ Carrier
- ☎ Text to speech
- ☎ Hardware (overheating Servers)

Asterisk design

- ☎ Asterisk was not designed with 16T1s in mind. (368TDM lines + 46IAX intern)
- ☎ Locking (e.g. enter/leave sounds)
- ☎ Minimal retry of locking (in channel.c)
- ☎ “Zap”-Chunk Size for processing base is 1ms, which can be changed but affects timing as well (at least in 1.2)
- ☎ Asterisk 1.2 uses way less resources
- ☎ Asterisk 1.2 more stable under load

Performance CPU Load

- ☎ Make sure your CPU has plenty of Speed and as many cores as available
- ☎ Your system will take full advantage of all cores (against common believe).
- ☎ AMD CPUs perform better under certain conditions, which includes heavy IO and multi threads on same data.
- ☎ Monitor spread on multi CPU systems since load can build up on single Cores if not designed correctly

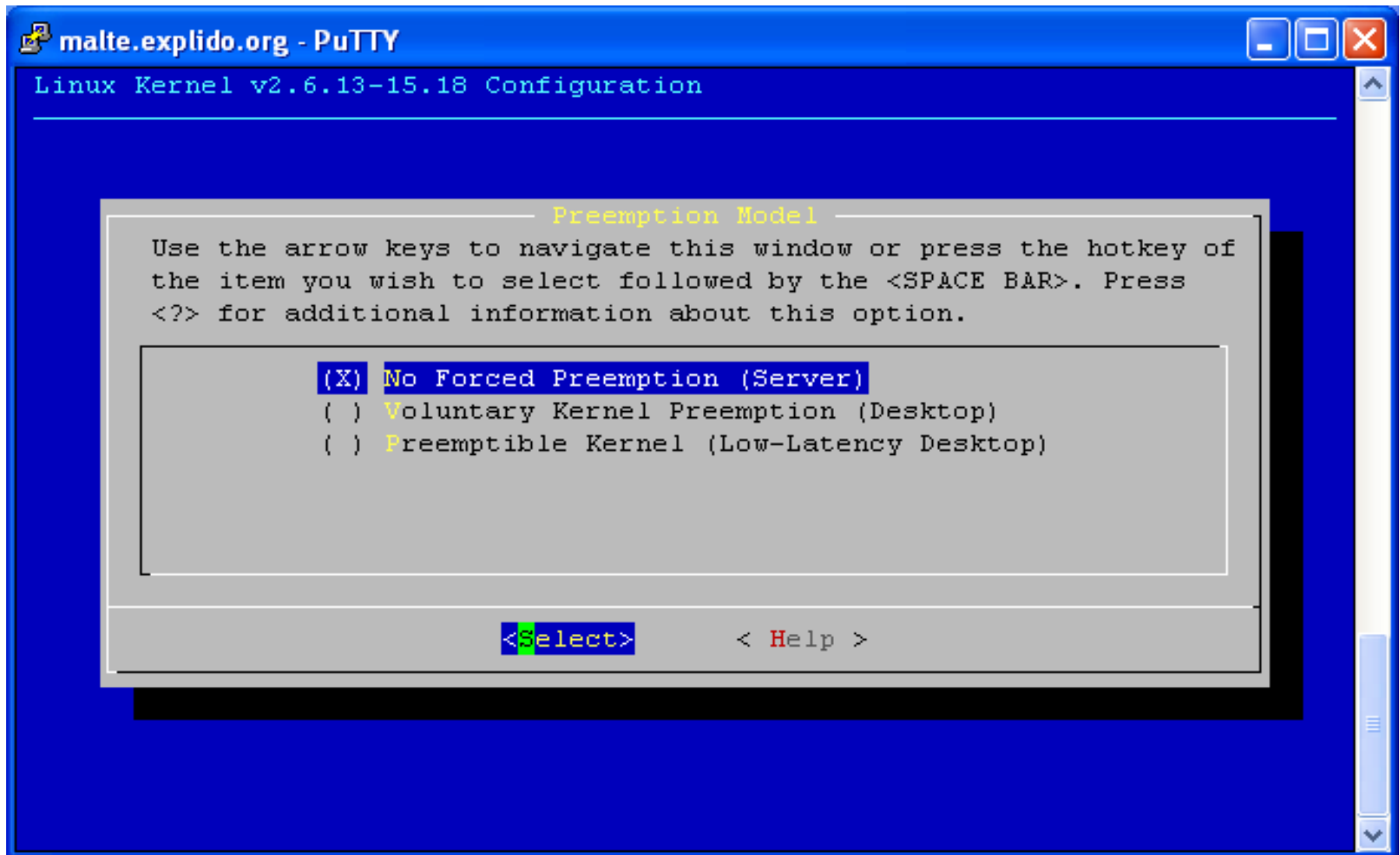
IO Bandwidth and Latency

- ☎ Audio issues get introduced when IO-wait increases
- ☎ Typical causes are HDD or Network, but can be TDM Cards as well.
- ☎ Monitor iostat for IO-wait
- ☎ Run Linux fully in RAM
- ☎ Using the right IO-Scheduler for the right Controller and Drives
- ☎ Never use anything that does IO-polling

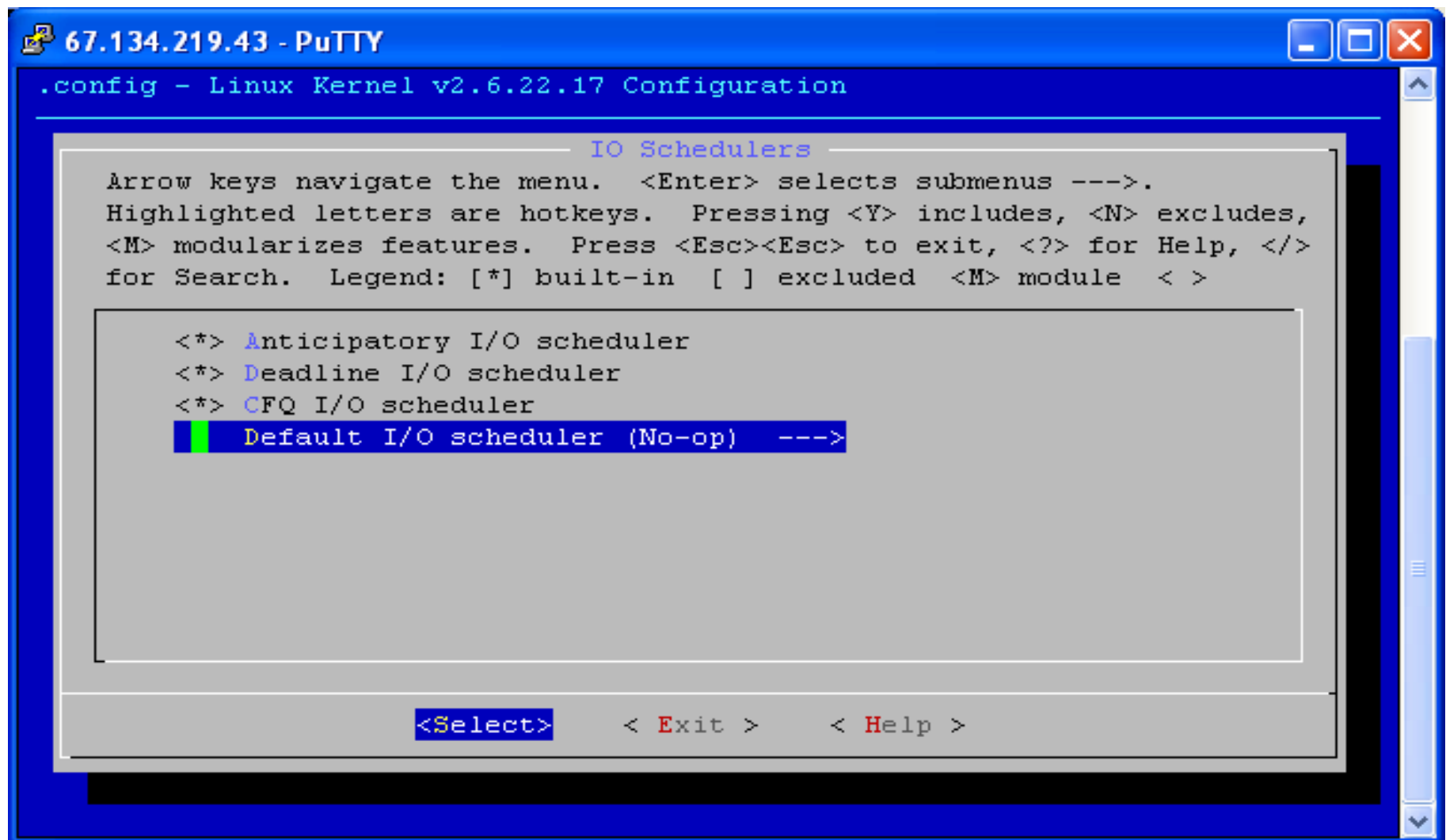
Zaptel optimization

- ☎ Increase Zaptel chunk Size (40 or 80)
- ☎ Make sure tone duration is changed as well.
- ☎ Increase of maximum device-nodes, open nodes, etc
- ☎ 64 bit runs better by our experience with high number of channels
- ☎ Interrupts are reduced by ChunkSize
- ☎ IRQBalancing will avoid Audio problems

Kernel optimization



Kernel optimization



The image shows a PuTTY terminal window titled "67.134.219.43 - PuTTY". The terminal displays the "Linux Kernel v2.6.22.17 Configuration" menu for "IO Schedulers". The menu is a list of options with a legend at the top. The legend explains that arrow keys navigate the menu, <Enter> selects submenus, <Y> includes, <N> excludes, <M> modularizes, <Esc><Esc> exits, <?> is for help, </> is for search, and [*] means built-in, [] means excluded, and <M> means module. The list of schedulers includes: Anticipatory I/O scheduler, Deadline I/O scheduler, CFQ I/O scheduler, and Default I/O scheduler (No-op) --->. The "Default I/O scheduler (No-op) --->" option is currently selected and highlighted with a blue background. At the bottom of the menu, there are three options: <Select>, < Exit >, and < Help >.

```
67.134.219.43 - PuTTY
.config - Linux Kernel v2.6.22.17 Configuration

                                IO Schedulers
Arrow keys navigate the menu.  <Enter> selects submenus --->.
Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes,
<M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help, </>
for Search.  Legend: [*] built-in  [ ] excluded  <M> module  < >

[*] Anticipatory I/O scheduler
[*] Deadline I/O scheduler
[*] CFQ I/O scheduler
[*] Default I/O scheduler (No-op) --->

                                <Select>  < Exit >  < Help >
```

Kernel optimization

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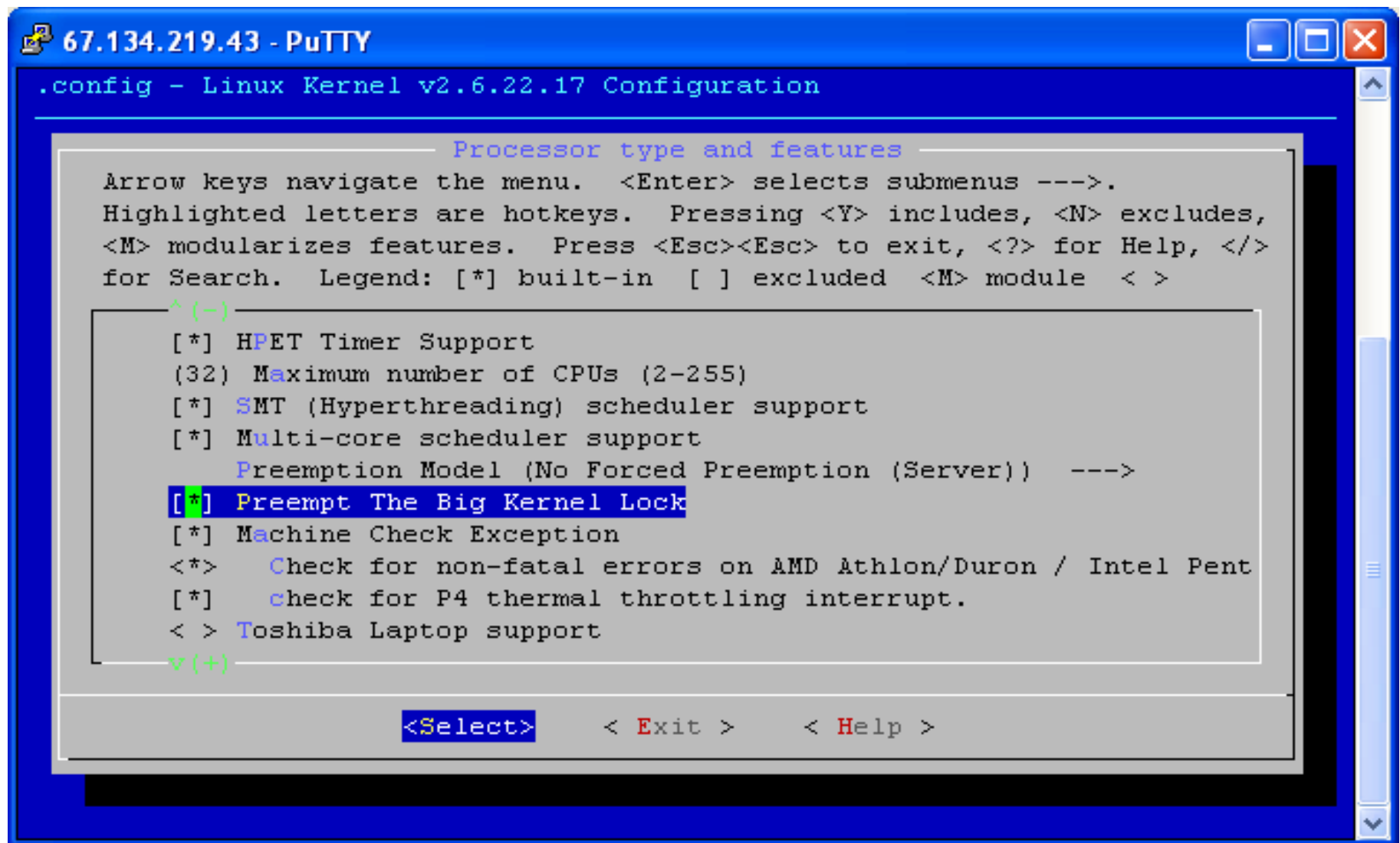
Processor type and features

Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes,
<M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </>
for Search. Legend: [*] built-in [ ] excluded <M> module < >

[*] Tickless System (Dynamic Ticks)
[*] High Resolution Timer Support
[*] Symmetric multi-processing support
    Subarchitecture Type (Generic architecture (Summit, bigsmp, E
[*] Paravirtualization support (EXPERIMENTAL)
    [*] VMI Paravirt-ops support
        Processor family (Pentium-4/Celeron(P4-based)/Pentium-4 M/old
[*] Generic x86 support
[*] HPET Timer Support
(32) Maximum number of CPUs (2-255)
v(+)
```

<Select> < Exit > < Help >

Kernel optimization



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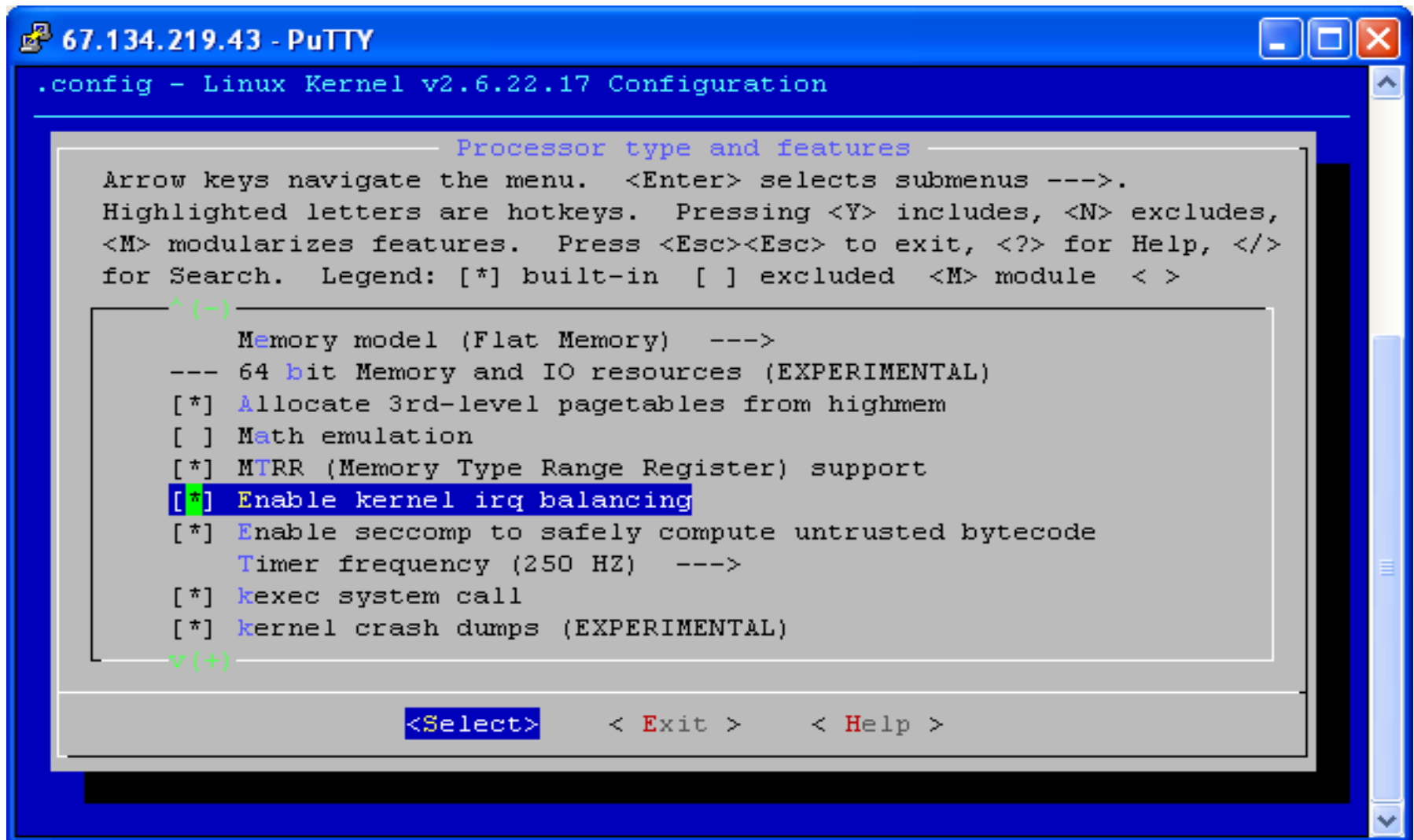
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^ (-)
[*] HPET Timer Support
(32) Maximum number of CPUs (2-255)
[*] SMT (Hyperthreading) scheduler support
[*] Multi-core scheduler support
    Preemption Model (No Forced Preemption (Server)) --->
[*] Preempt The Big Kernel Lock
[*] Machine Check Exception
<*> Check for non-fatal errors on AMD Athlon/Duron / Intel Pent
[*] check for P4 thermal throttling interrupt.
< > Toshiba Laptop support

v(+)

<Select> < Exit > < Help >
```

Kernel optimization



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^ (-)
  Memory model (Flat Memory) --->
  --- 64 bit Memory and IO resources (EXPERIMENTAL)
  [*] Allocate 3rd-level pagetables from highmem
  [ ] Math emulation
  [*] MTRR (Memory Type Range Register) support
  [*] Enable kernel irq balancing
  [*] Enable seccomp to safely compute untrusted bytecode
  Timer frequency (250 HZ) --->
  [*] kexec system call
  [*] kernel crash dumps (EXPERIMENTAL)
v (+)

<Select>    < Exit >    < Help >
```

Carrier

- 📞 Channels Hanging, released but not really available for new dials yet
- 📞 Inconsistent Q.931 response codes
- 📞 ALERT INBAND with various audio
- 📞 Audio on Channel after “normal clearing” or ALERT INBAND
- 📞 Overloading switch (all T1s in same shelf)
- 📞 Rotation and (600ms) Delay

Text to Speech

- ☎ Pre-generated output
- ☎ Do not start single processes but use Server modes
- ☎ Limit concurrent generation.
- ☎ Caching output for reuse

New Ideas!

 1.6 looks promising

 look into chan_woomera

Thanks for listening

 Come and visit our ViciDial website for tips about large scale implementation issues