



**"QL and Mac are 25"
25th anniversary 2009**

QPC

"Why, when and how?"

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Agenda

- 1. Personal Introduction**
- 2. History of QPC**
- 3. Development tools**
- 4. QPC technology**
- 5. SMSQ/E**
- 6. Q&A**

Personal introduction

- ❖ Author of QPC, the first software only QL emulator for PCs
- ❖ Main developer of QL OS SMSQ/E after Tony Tebby quit
- ❖ Actual software developer, not yet a PowerPoint drone
- ❖ Not really a public speaker
- ❖ -> You get what you pay for 😊

Timeline

- ❖ 1979 Born 😊
- ❖ 1986 Started with a ZX81 (BASIC)
- ❖ 1988 Finally got my own QL
- ❖ 1993 Got a PC. With it the idea of „PCQL“ is born
- ❖ 1995 First beta of QPC shown at a QL meeting
- ❖ 1996 QPC v1.00 (DOS) goes on sale
- ❖ 1999 QPC2 (Windows) is released
- ❖ 2002 QPC2 v3.00 sees the light

How did this look like?



Why QPC?

- ❖ I loved my QL and felt guilty for switching to a PC (but it could do more than 8 colours! Who could resist?)
- ❖ Somebody said I couldn't do it (my friend Jochen Hassler of ATR-device, DISA, Eprommer II and other fames)

QPC beta

- ❖ First presented at a QL meeting near Munich
- ❖ Emulated original QL hardware
- ❖ Ran QDOS (mainly Minerva)
- ❖ People were so excited they even wanted to buy the beta version

QPC beta demonstration

QL 482K 1476 Sysdef Exec Pick Ljob QD Dateien DISA U2d05

Job	Owner	Size	Priority	Name
0	0	9k	32	BRSTC
1	0	1k	S 1	FreeMem
2	0	1k	1	System Job
3	0	2k	S 126	U: Sysdef
4	0	2k	S 126	U: Exec
5	0	2k	S 126	U: Pick
6	0	2k	S 126	U: Ljob
7	0	2k	S 126	U: QD
8	0	2k	S 126	U: Dateien
9	0	2k	S 126	U: DISA U2d05
10	0	1k	0	HOTKEY

492032 bytes free

QL bereit...

JSL1 0005 Rom U 1096
640 KB Hauptspeicher
481 KB freier Speicher

This is not a QXL!!!

It's **QPC**

The gamma-version of a software-only QL emulator for the PC!

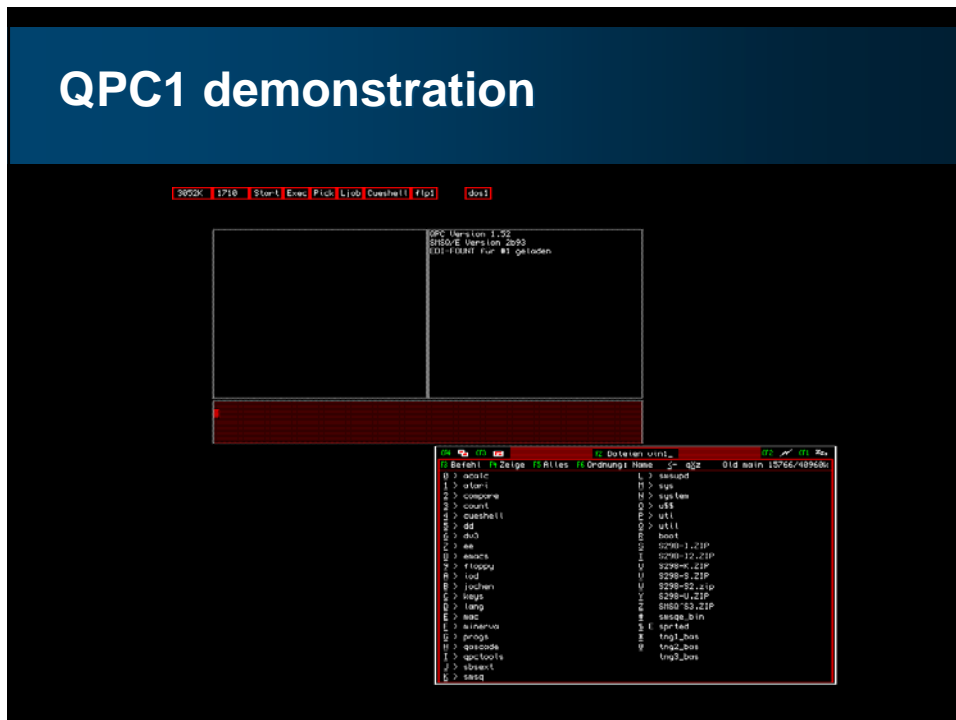
Switch to SMSQ/E

- ❖ Emulating native hardware is expensive. A specially adapted OS was called for
- ❖ We decided that SMSQ/E would be better suited than QDOS/Minerva
- ❖ In Oct '95 J. Hassler contacted J. Merz for me regarding SMSQ/E
- ❖ In Dec '95 first sources arrived by mail (notice the lack of "e" in "mail")
- ❖ In Feb '96 sources were complete

QPC1 (1996 – 1999)

- ❖ Runs with a specially adapted version of SMSQ/E instead of QDOS
- ❖ No native hardware emulated (except to a degree the screen)
- ❖ 100% assembler code (~15000 lines)
- ❖ Only 4 bugs in 68k emulation found over the next 13 years (the fourth was discovered in 2006!)

QPC1 demonstration



QPC2 v1 (1999 – 2001)

- ❖ QPC1 needed a specially booted DOS version to work
- ❖ When Win95 became more prevalent, shouts for a native Windows version became louder
- ❖ QPC2 v1 was finally released in 1999
- ❖ Halve C (Windows stuff), halve assembler code (68k core and glue)
- ❖ Looks and feels much like QPC1

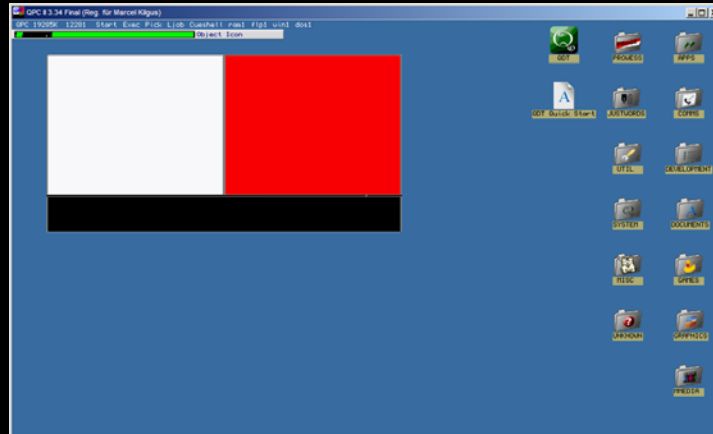
QPC2 v2 (2001 – 2002)

- ❖ Introduced 16-bit graphics (GD2)
- ❖ Now also supported windowed mode instead of just full screen
- ❖ Accelerated graphics
- ❖ Floating point acceleration
- ❖ New “DOS” device to directly access PC mass storage devices

QPC2 v3 (2002 – today)

- ❖ Polishing release with many small improvements (user wish list)
- ❖ Wheel mouse support
- ❖ Power management
- ❖ New beeper emulation (NT/2K compatible)
- ❖ Sampled sound system support!
- ❖ TCP/IP support
- ❖ 68020 emulation core (written with the help of George Gwilt)

QPC2 v3 demonstration



Development tools (QPC1)

- ❖ Assembler choice was between Borland Turbo Assembler and Microsoft Assembler
- ❖ TASM won hands down
- ❖ Debugged using Borland Turbo Debugger

Development tools (QPC2)

❖ v1, v2

- ❖ C parts compiled using Microsoft C v6
- ❖ Assembler parts in TASM
- ❖ Debugger NuMega SoftICE
- ❖ Borland MAKE
- ❖ IDE Borland CodeWright

❖ v3

- ❖ C parts compiled using Microsoft C v8 (2005)
- ❖ Assembler parts in MASM
- ❖ Borland MAKE still employed
- ❖ Visual Studio used as debugger and IDE

Emulation core

- ❖ Was mainly 68000 compatible, but was declared as 68010 as it allowed data access to odd addresses
- ❖ Later QPC2 v3 releases were made 68020 compatible
- ❖ 8000-9000 lines of assembler code
- ❖ Line A emulator (\$Axxx opcodes) used as OS interface

Emulation interface

❖ Mostly one way: SMSQ/E -> PC

❖ Line A examples:

- ◆ \$A200 qpc.sexst does ser port Dr exist?
- ◆ \$A210 qpc.sinit init ser port no. Dr
- ◆ \$A220 qpc.sopen open ser port no. Dr
- ◆ \$A230 qpc.sclse close ser port no. Dr
- ◆ \$A240 qpc.ssend send bytes in ser queue
- ◆ Usage: dc.w qpc.ssend+4 ; Send queue now

Memory management

- ❖ As laptops got more and more common, preserving the battery became more important
- ❖ Emulation used to run at 100%, so CPU could never sleep
- ❖ Question is, when to sleep? Do go to sleep after 5 consecutive scheduler runs, but:
 - ◆ Don't if mouse was moved
 - ◆ Don't if key was pressed
 - ◆ Don't if a trap #1, #2 or #3 was issued

SMSQ/E

- ❖ Originally programmed by QDOS inventor Tony Tebby
- ❖ Co-developed by me since 1996 (but mainly QPC parts)
- ❖ Open source since 2002
- ❖ Maintainer Wolfgang Lenerz
- ❖ Out of 111 changes since then 80 were (co-)developed by me

SMSQ/E technical facts

- ❖ Completely written in 68k assembler
- ❖ About 2000 source files, containing 222000 lines of code
- ❖ Compiled between 260 and 330kB big (depending on platform)
- ❖ Compiled using QMake, QMac and QLink/Tony Tebby linker
- ❖ Alternatively: Lenerz' Make, GWASS and Tony Tebby Linker

SMSQ/E major new features (by me)

- ❖ Improved high colour support in display driver, including alpha blending for sprites
- ❖ High colour capable WMAN2
- ❖ Aurora 8-bit driver
- ❖ SBasic command line history
- ❖ Background I/O support (!)
- ❖ New Ctrl+C job switching

SMSQ/E major new features (others)

- ❖ Opaque window move routine (WL)
- ❖ HOME directory thing (WL)
- ❖ Sprite used as cursor (WL)
- ❖ Some QXL enhancements

SMSQ/E fun bug facts

- ❖ One user complained that SBASIC wouldn't run his SuperBasic program
 - ◆ He had written procedures that took as many as 357 parameters! All named X0, X1, X2 etc.
 - ◆ One line alone in that program was almost 2kb long
 - ◆ I actually found and fixed the problem ☺
- ❖ In v3.00 I've finally fixed a bug in the PE that has "bugged" me since 1989

What's next for me?



Q&A

Happy 25th anniversary and *QL forever!*

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