

Pervasive Big Blue

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Two Quotes. . .

I think there is a market for maybe five computers worldwide.

—THOMAS J. WATSON, CHAIRMAN OF IBM, 1943

The second important trend we are preparing for is called “**pervasive computing**” . . . So the networked world . . . will extend further to **interconnect perhaps a trillion “intelligent” devices.**

—LOUIS V. GERSTNER, JR., CHAIRMAN AND CEO OF
IBM, 1998 [?]

Pervasive? Ubiquitous? Pervasive!

Ubiquitous: existing or being everywhere at the same time, constantly encountered [?]

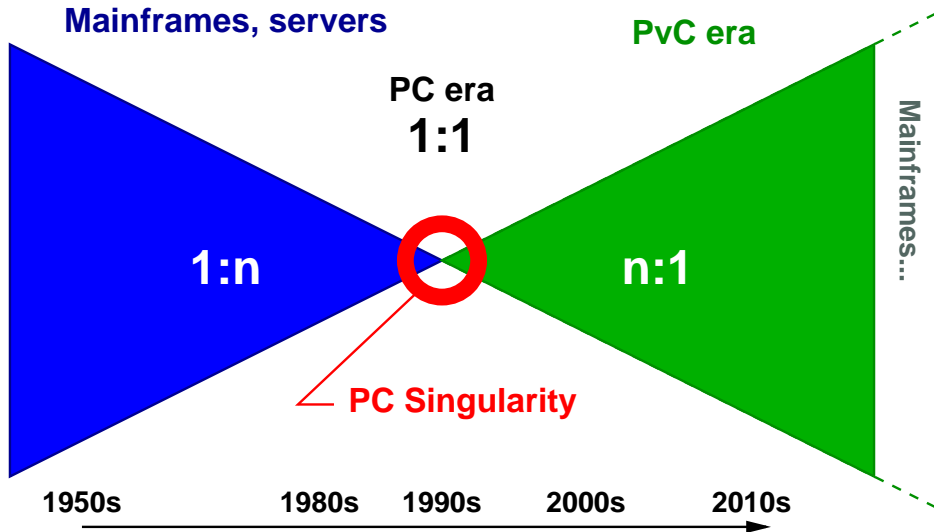
Pervasive: diffusing throughout every part of [?]

- Ubiquitous is now... **Boring!**
- Pervasive is not yet... **Exciting!**

What is Pervasive Computing?

- **The Perfect Funding Tool!**
by definition everything fits into PvC...
- **Computers disappear,**
environment and computing devices blend into one another
- "Age of calm technology"[?]
- **Interconnected-ness**
- Wide range of fields
(networking, UI, OS, distributed systems, security, DB, electrical eng, sociology, psychology, design,...)

Past the PC Singularity



Pervasive Big Blue



almaden



austin



tj watson



zurich

haifa



india



china



tokyo

TJ Watson: multi-modal, web, gryphon, voice,...

Almaden: PAN, micro drive, TSpaces, DB, Blue Eyes,...

Austin: PowerPC, web timing,...

Tokyo: WatchPad, GinJo net, LCD, Dharma,...

China: M-Commerce, Chinese lang supp,...

India: Wireless net modelling & analysis,...

Haifa: Palm Pirate, internet telephony,...

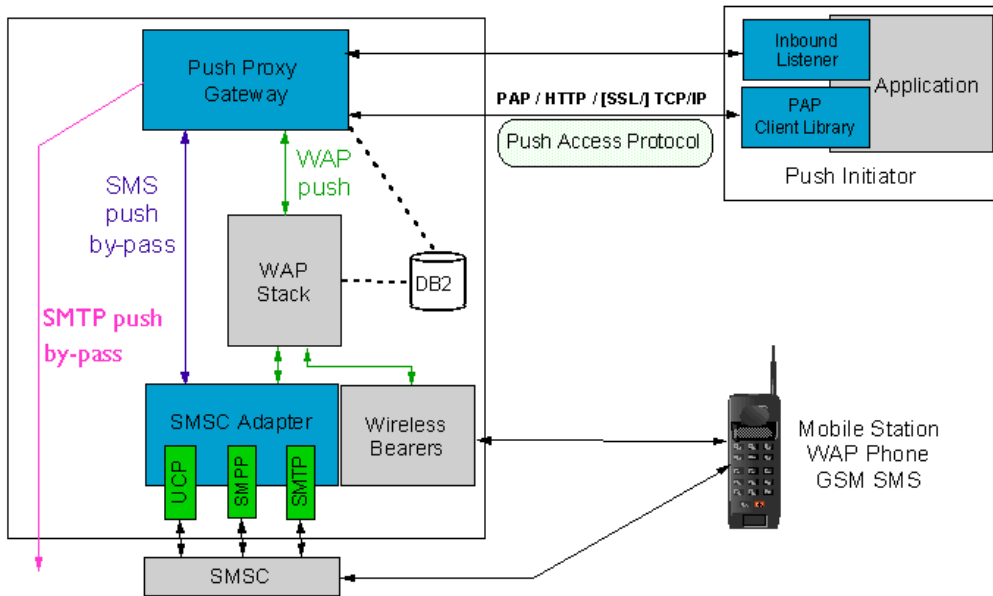
Zurich: Mobile comp, security, service provisioning,...

Coming Up. . .

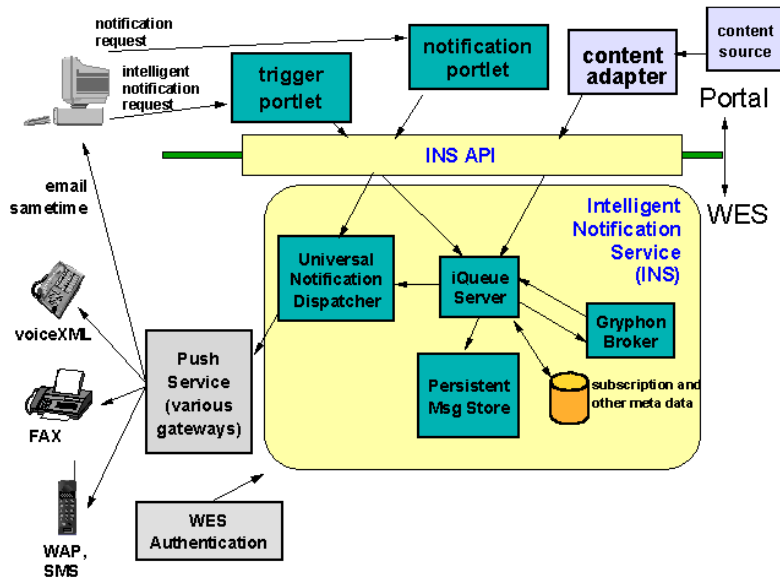
- Mobile (research) activities
 - Push Proxy GW
 - Intelligent Notification
 - Context Services
 - Multimodal
 - Fluid Communications
 - DAB Datacasting
- Secure client: JavaCard
- Devices
 - LinuxWatch/WatchPad
 - Microdrive
 - Direct-to-Digital GPS
 - OLED

A snapshot, really!

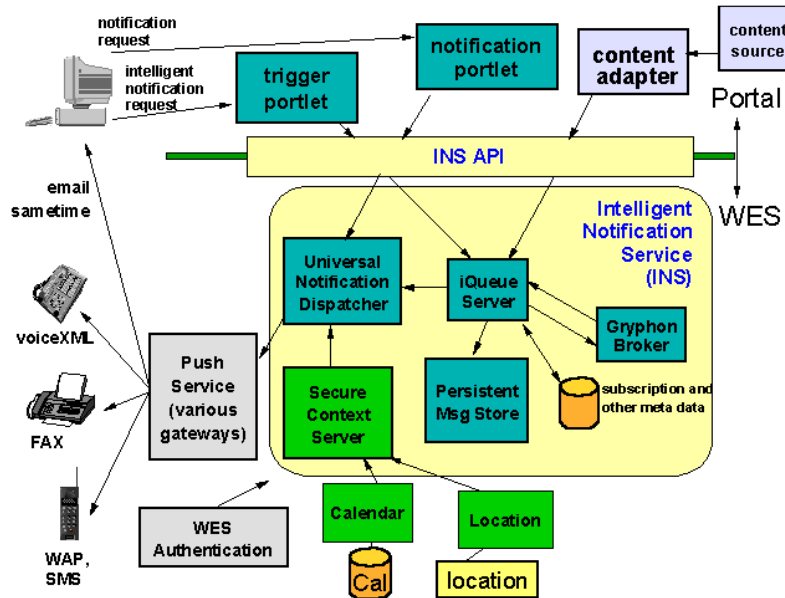
Zurich:Mobile:Push Proxy Gateway



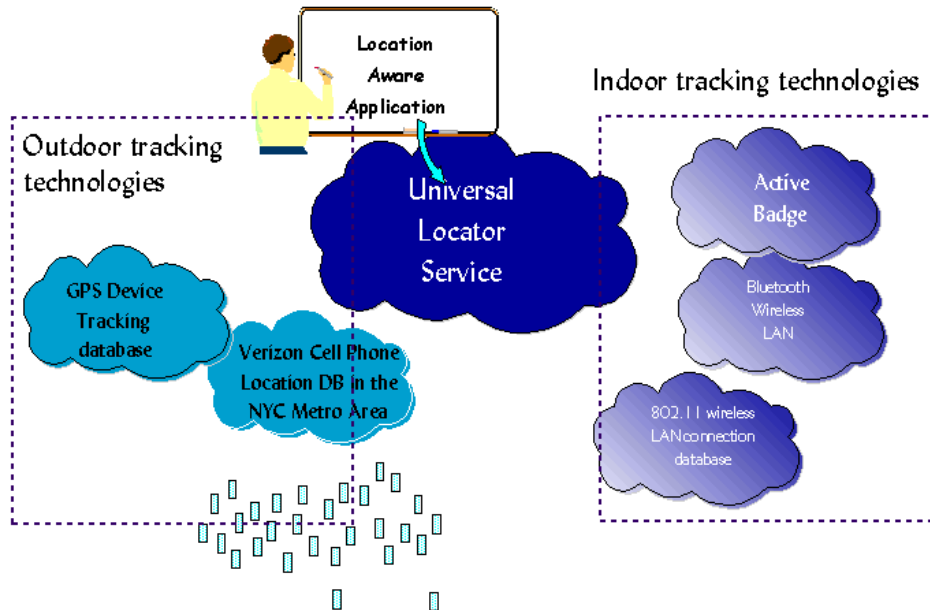
Zurich:Mobile:Intelligent Notification



Zurich/Watson:Mobile:Context Services



Challenge: Distributed Location Information



Watson:Mobile:Multimodal

Today

Tell me the direct flights from New York to San Francisco after 7:30pm today



Watson:Mobile:Multimodal

Today

Tell me the direct flights from New York to San Francisco after 7:30pm today



There are five direct flights from New York's LaGuardia airport to San Francisco after 7:30pm today: Delta flight nnn departing 7:30pm, American flight nnn departing 7:55pm, United flight nnn departing 8:30pm, Continental flight nnn departing

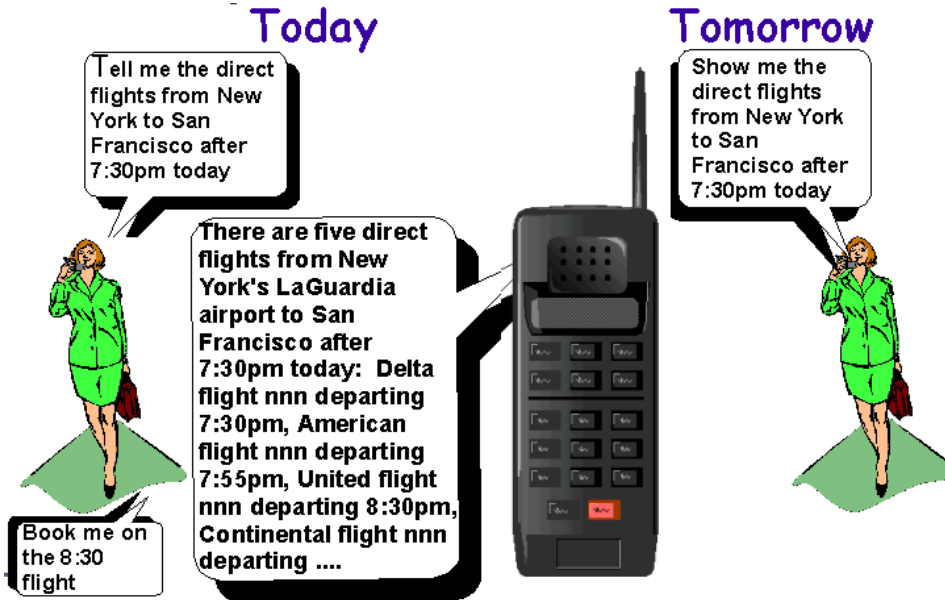


Watson:Mobile:Multimodal

Today



Watson:Mobile:Multimodal



Watson:Mobile:Multimodal

Today

Tell me the direct flights from New York to San Francisco after 7:30pm today



Book me on the 8:30 flight

There are five direct flights from New York's LaGuardia airport to San Francisco after 7:30pm today: Delta flight nnn departing 7:30pm, American flight nnn departing 7:55pm, United flight nnn departing 8:30pm, Continental flight nnn departing

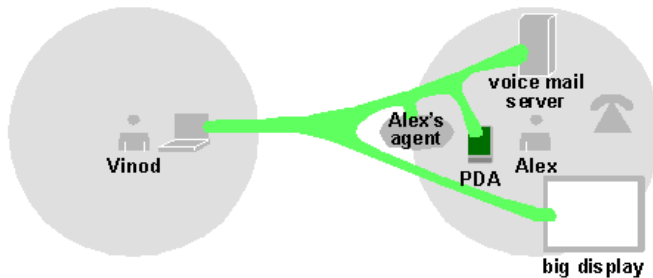
| FROM | TO | FLIGHT | DEP | ARR |
|----------|-----|--------|--------|-----|
| FROM | LA | TO | SFO | |
| NON-STOP | | | | |
| DL | nnn | 7:30p | 10:55p | |
| AA | nnn | 7:55p | 10:55p | |
| UA | nnn | 8:30p | 11:55p | |
| CO | nnn | 8:45p | 0:10p | |

Tomorrow

Show me the direct flights from New York to San Francisco after 7:30pm today



Zurich:Mobile:Fluid Communications



- **Def. fluid:** at any point in time the user can extend a communication session to a new device

- Alex is in "meeting mode"
- Vinod calls Alex
- Call simultaneously on PDA communicator and voice mail
- Server transcribes speech to text

Voice Mail Transcript

from: Vinod Nagarajan

hi alex my name is vinod nagan I am a colleague of romesh we have succeeded in integrate your software and were able to complete the first test scenario we are really

Listen

Pick Up

Phone in C201

- Alex picks up call and extends to big display

Zurich:Mobile:DAB Datacasting

- How to reach millions of mobile devices? and distribute large content?
- **GSM, GPRS:** available, **low bandwidth**
- **UMTS:** 2003-4, expensive, **high bandwidth only when stationary**
- **Digital Audio Broadcast:** available, **high bandwidth** downlink (up to 1-2Mbit/s), inexpensive, high availability (indoors, outdoors, high-speed mobile)
- **DAB & Mobile: interesting & attractive platform for mobile services**



Zurich: Mobile: DAB Datacasting

■ DAB CA-PK

- Subscriptions mechanism for content distribution
- Works for both DAB-only and DAB-mobile devices
- No additional hardware required
- Secure solution, consumer part of the protection chain

■ DAB/Mobile

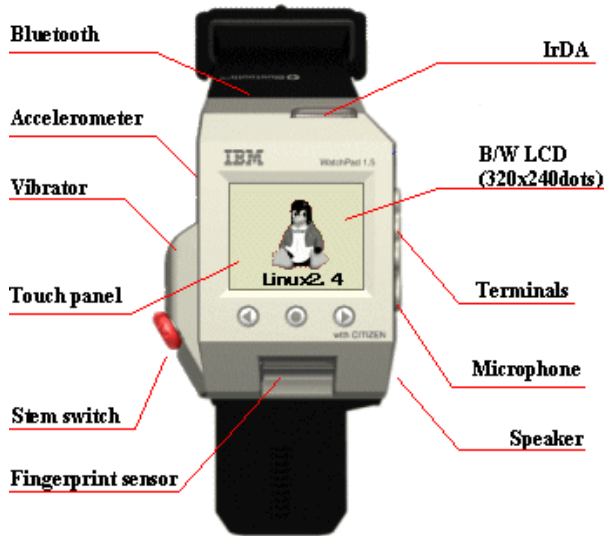
- Combine DAB receiver with mobile (GSM/GPRS/UMTS) component
- DAB: broadband downlink
- GSM: narrow band uplink (e.g., SMS)
- Apps: **CD shop**, **"pump-or-dump"**, **games**, **voting**, . . .

Zurich:Secure Clients:JavaCard

- JavaCard game changer for smart card industry
- IBM Research JavaCard state of the art
 - JavaCard + OP (= JCOP)
 - PKI
 - 1024-2048 bit crypto
- 16-32 KBytes free EEPROM
- Signing: 200-400ms
- Onboard key generation: 6-9s
- Current price point: USD 3.50

It really is a secure, embeddable coprocessor!

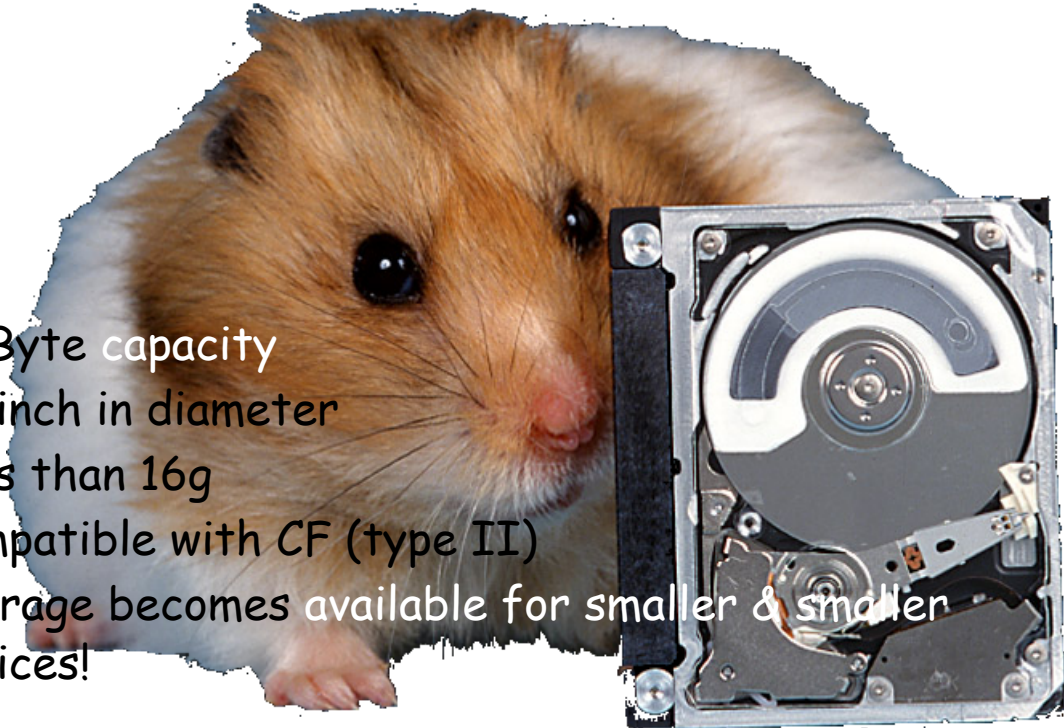
Tokyo/Watson:Devices:Linux Watch



Size: 65mm x 46mm x 16mm
Weight: 43g (w/o band)
CPU: Low power 32-bit, 18-74 Mhz
I/O: Touch panel, stem switch, buttons
Display: 320x240 B/W LCD
Memory: 8 MB low power DRAM, 16 MB Flash
Comm: Bluetooth, IrDA, serial
Power: Rech. Li-Ion
Speaker, mic,
Other: fingerprint sensor, accelerometer, vibrator
OS: Linux 2.4 w/ XFree

Almaden: Devices: Microdrive

- 1 GByte capacity
- 1.0 inch in diameter
- Less than 16g
- Compatible with CF (type II)
- Storage becomes available for smaller & smaller devices!



Watson:Devices:Direct to Digital GPS



- Direct to digital
- Complete solution
- SiGe radio front end
- 12 channels
- Antenna not included
- Apps: Tracking rail waggons, location aware devices, **pervasive peer-to-peer**

Zurich: Devices: OLED



- Very bright
- Very high resolution
- Very flexible
- Game changer?!
- High quality electronic paper (combine with DAB!),
electronic picture frames,...

... And Much More

- **Voice recognition:** getting smaller and smaller
- **Ultra Wide Band RF:** pervasive very high bandwidth, pin-pointing location services
- **New Web technologies:** Freenet, peer-to-peer, ...
- **Face & gesture recognition:** mood based computing?
- **A Web of trillion devices:** service discovery, configuration, security, bootstrapping, managing—all in a world of a trillion connected devices?!