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Digisens

- Located in French Alps
- Created in 2002
- Our strengths :
  - Team Organization:
    - From research to tested software
  - Open to international customers

Digisens Business Field

1972

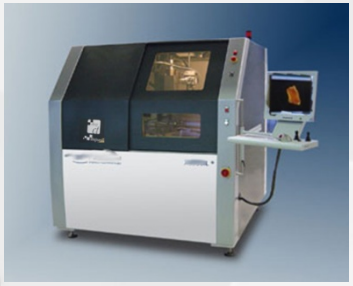
- HOUNSFIELD

- System efficient
- Too big and too hard to maintain

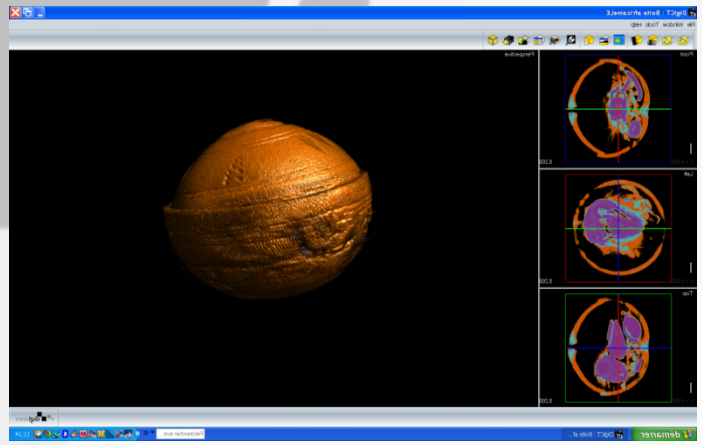
1995

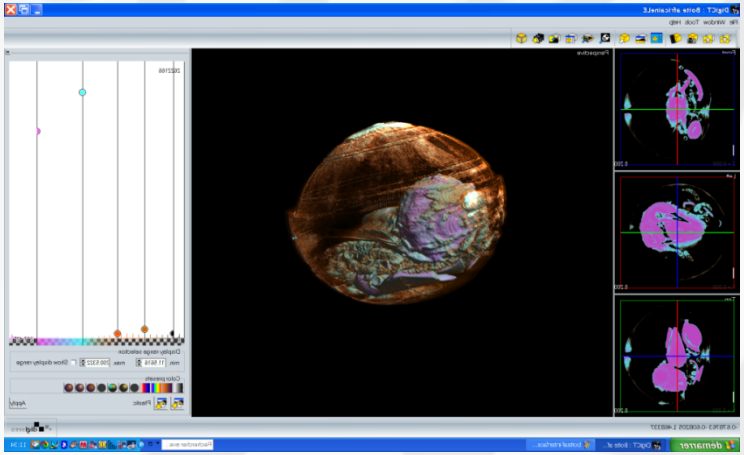
- Flat panel and PC improvement
- Compact CT

Our Software



GPU reconstruction



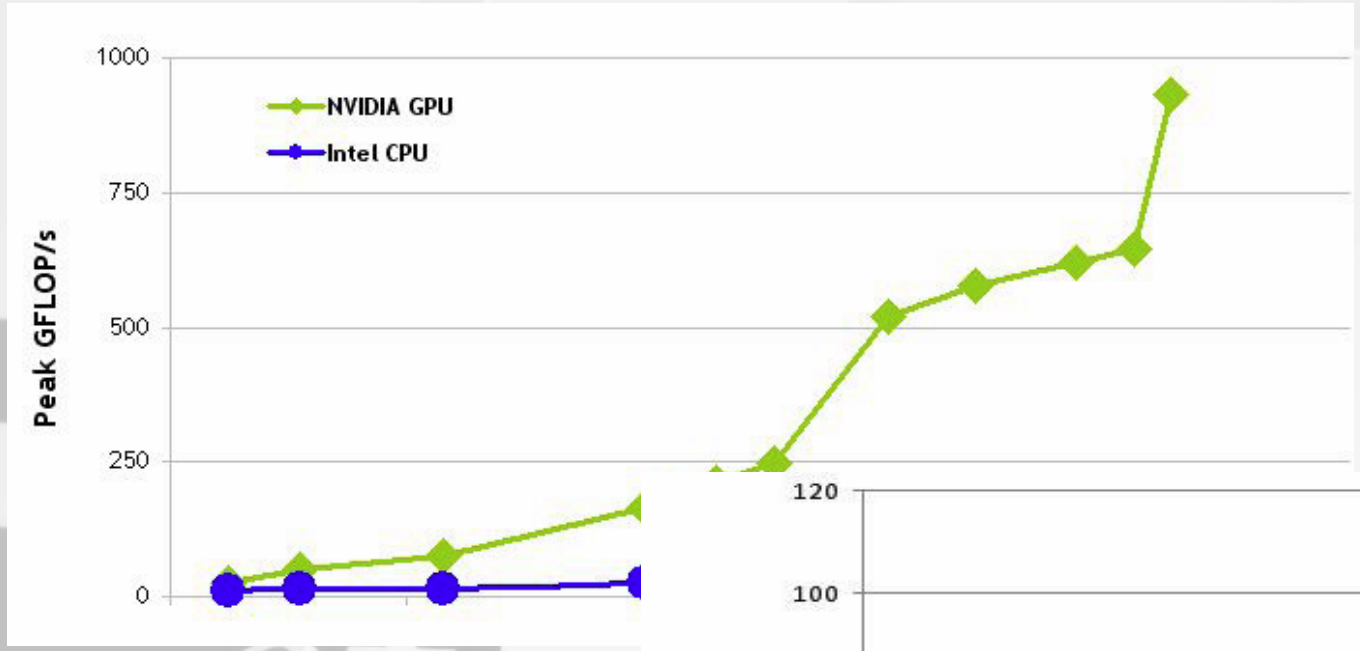


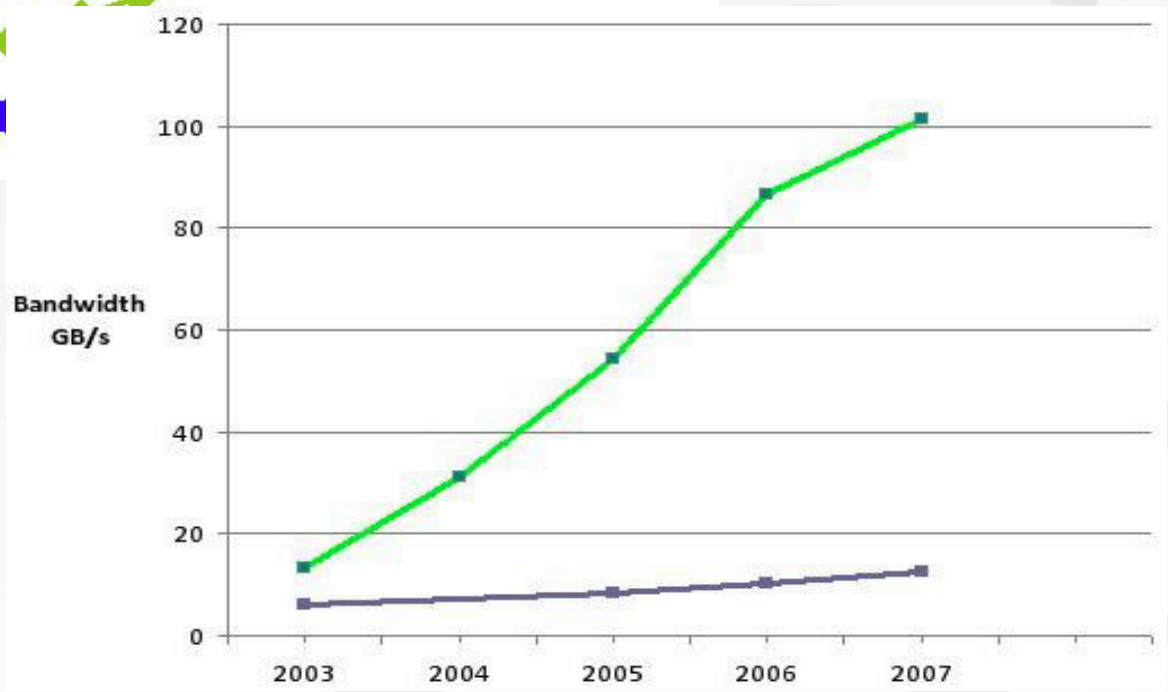
Courtesy of Grenoble museum

Why GPU ?

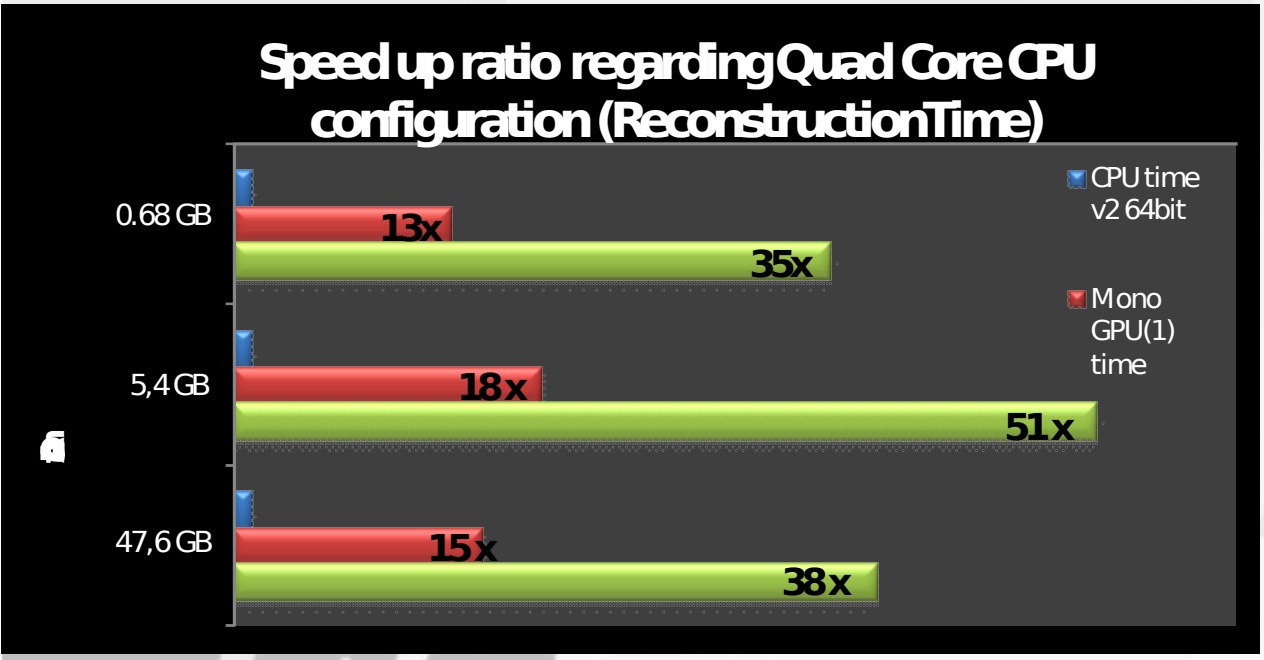
- Tomography algorithms speed is linear regarding computation cell number
- Tomography algorithms are well suited for SIMD architecture
- Huge speedup ratio compared to CPU version

Why GPU ?


1000
750
500
250
0
Peak GFLOP/s
NVIDIA GPU
Intel CPU

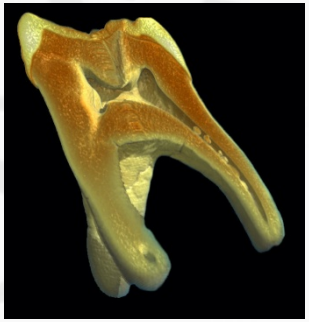

120
100
80
60
40
20
0
Bandwidth
GB/s
2003
2004
2005
2006
2007

FDK algorithm speed



C870 series

Speedup factor up to 50 and more to come

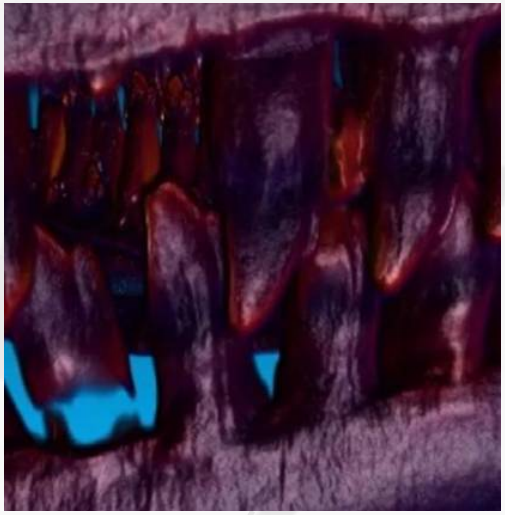


Number of radios	Radio Resolution	Volume size	CPU time v2 64bit	Mono GPU(1) time	Bi GPU(2) time	Tri GPU(3) time
360	512^2	512^3	2m 54s	7s	3s	2s
720	1024^2	1024^3	45m40s34ms	1min51s	57s	39s
2000	2048^2	2048^3	12h 58min	52min29s	26min 57s	20min16s
1080	8kx4k	4096^3	2j 10h 38min 24s	-	-	1j 6h 53min
4320	8kx4k	4096^3	9j 18h 33min 36s	-	-	5j 3h 32min

Digisens Vision

- Data processing speed is the key of the future

Reconstruction



Algorithm

Visualization

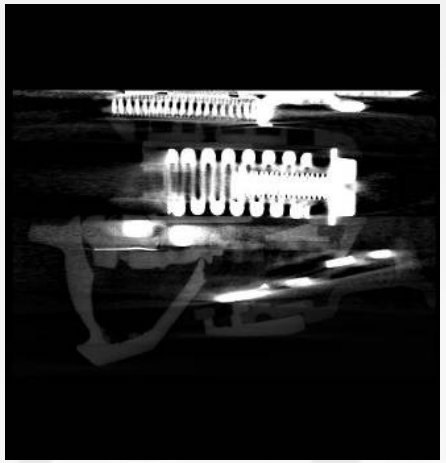
Current G1 | Generation G2 | Generation G3

Current | Future

Iterative algorithm speed

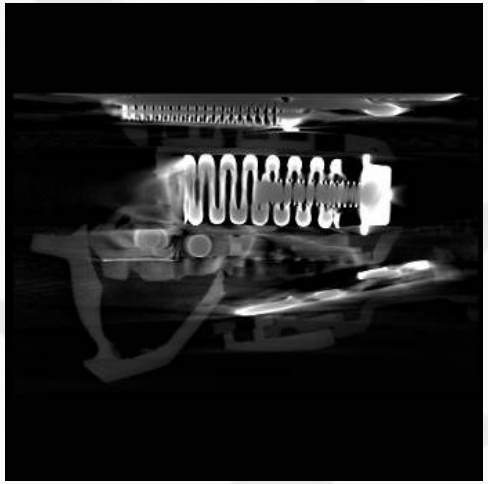
Reference algorithm for medical applications and electron tomography systems

Dose reduction allowance and better image quality



Number of radios	Radio Resolution	Volume size	CPU time v2 64bit	Mono GPU(1) time	Speed up Factor
200	256^2	256^3	1h24	15s	120
360	512^2	512^3	4h15	280s	55
140	1024^2	1024x1024x100	3h	135s	80

(1) G92 board, 1GB



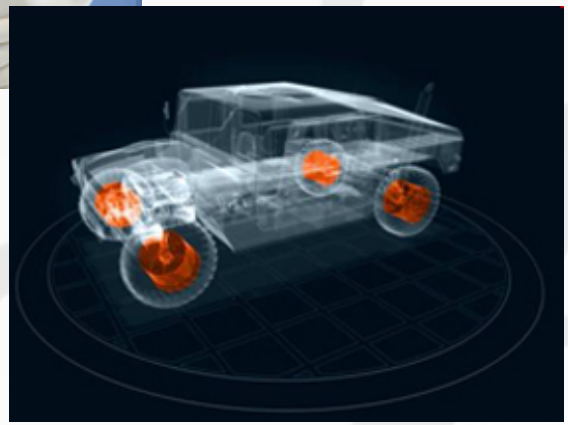
Huge speed up factor make those algorithms usable today

Digisens is positioned as a pioneering company in such development

Hutchinson

- Total Group
- 30’000 employees
- High-technology products in various domains
  - From surgical gloves

  - To bulletproof tires



Hutchinson

- For research purposes, Hutchinson uses tomography

- The adjunction of metallic parts in rubber leads to strong artifacts in the reconstruction

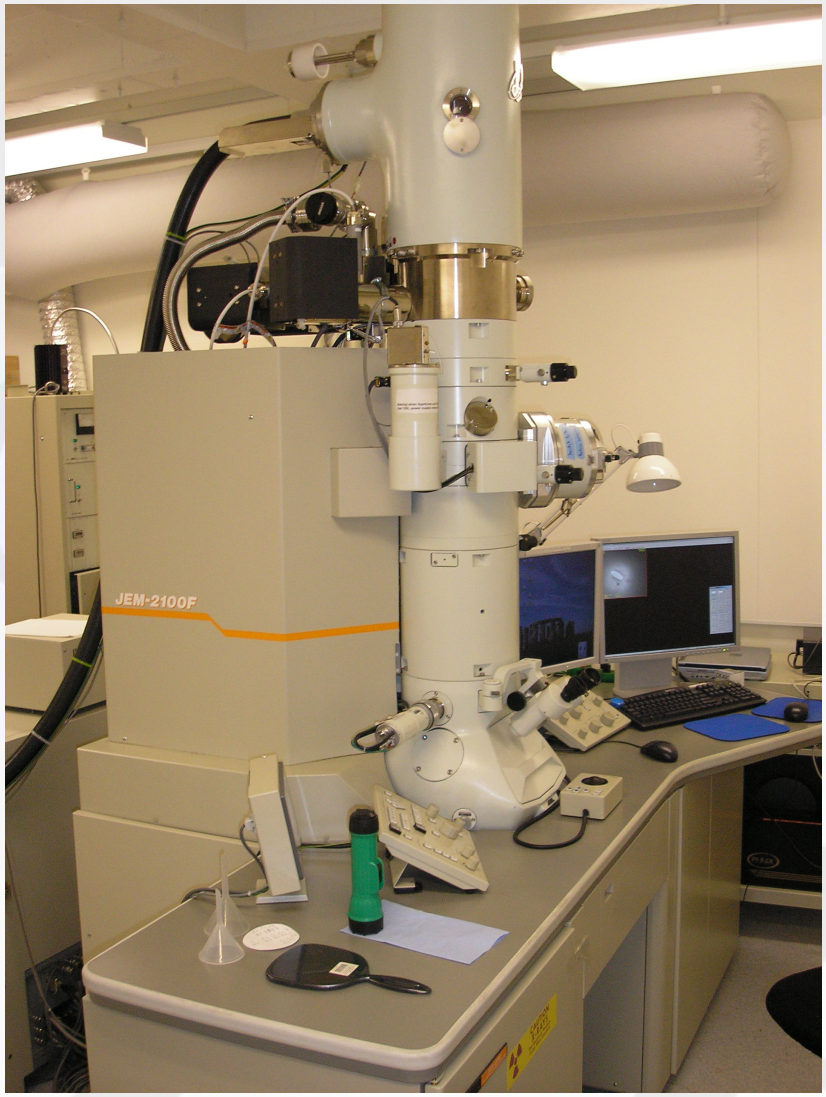
My internship

- Reconstruction quality improvement
- Reduction of artifacts
  - Use of iterative algorithms
  - Introduction of *a priori* knowledge

R&D partnership

institutCurie

Together, let's beat cancer.



Electronic CT for Institut Curie

Thank you

Questions ?

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