MT3 Presentation

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Lead-Architect

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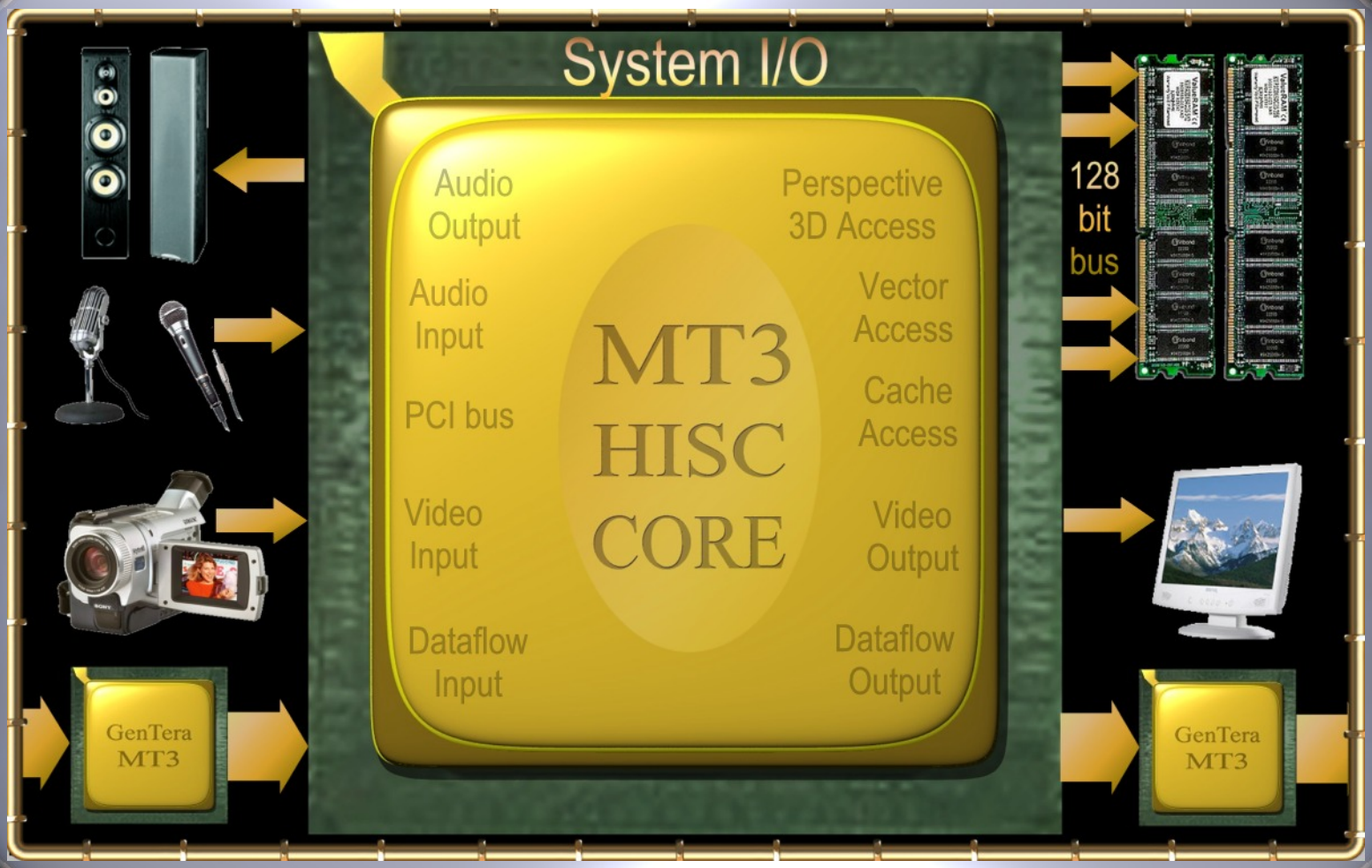
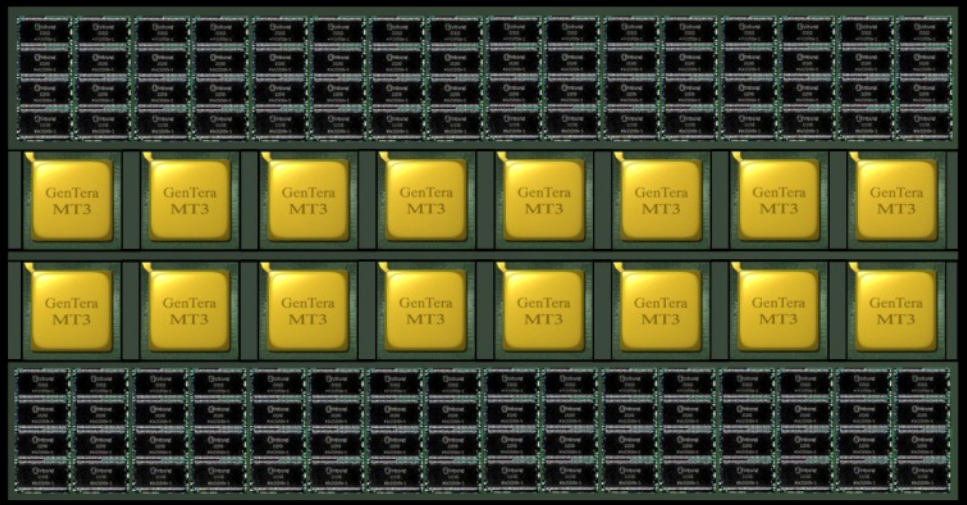
GenTera MT processor



Presentation

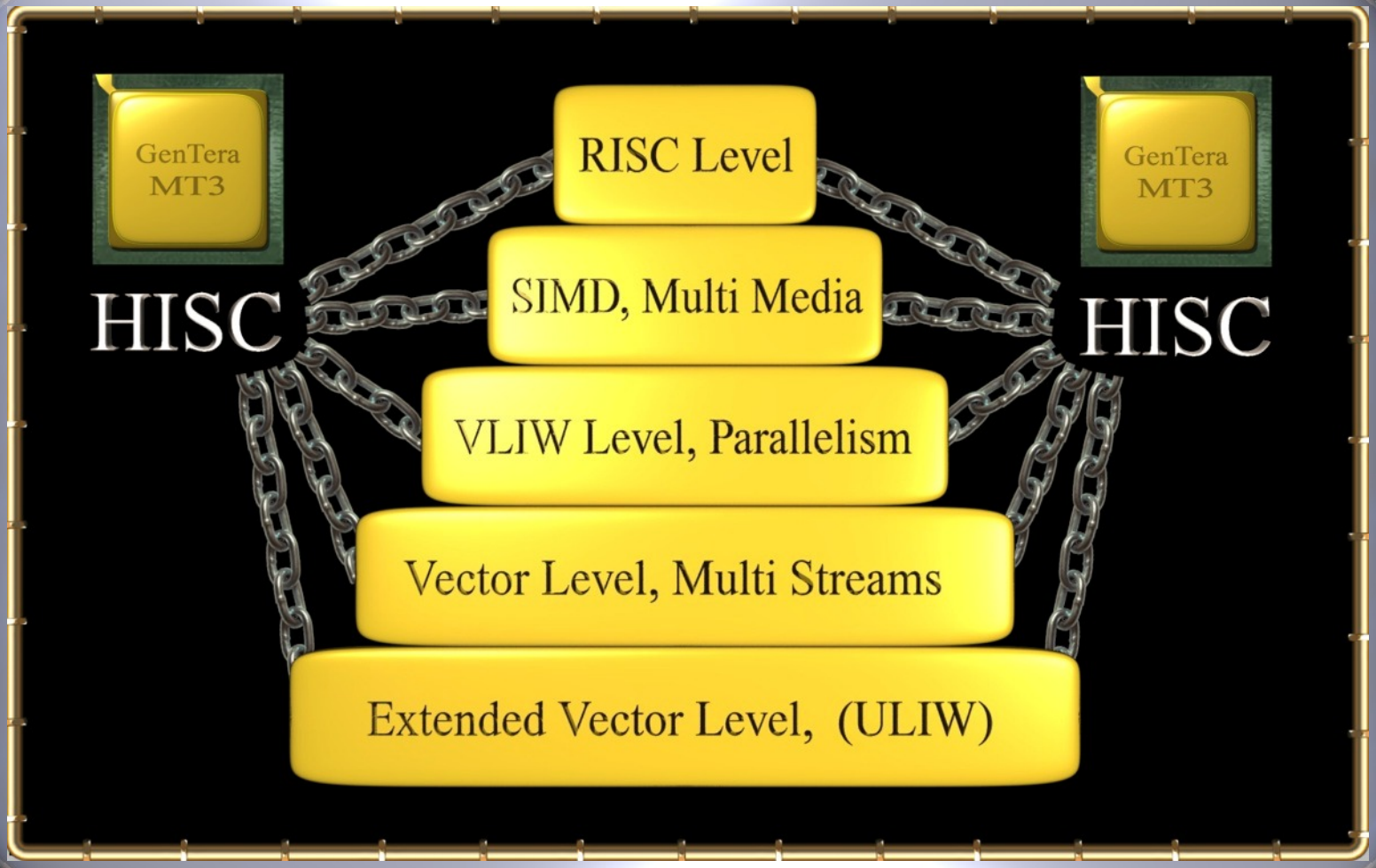
GenTera MT processor



High End Industrial and Medical applications

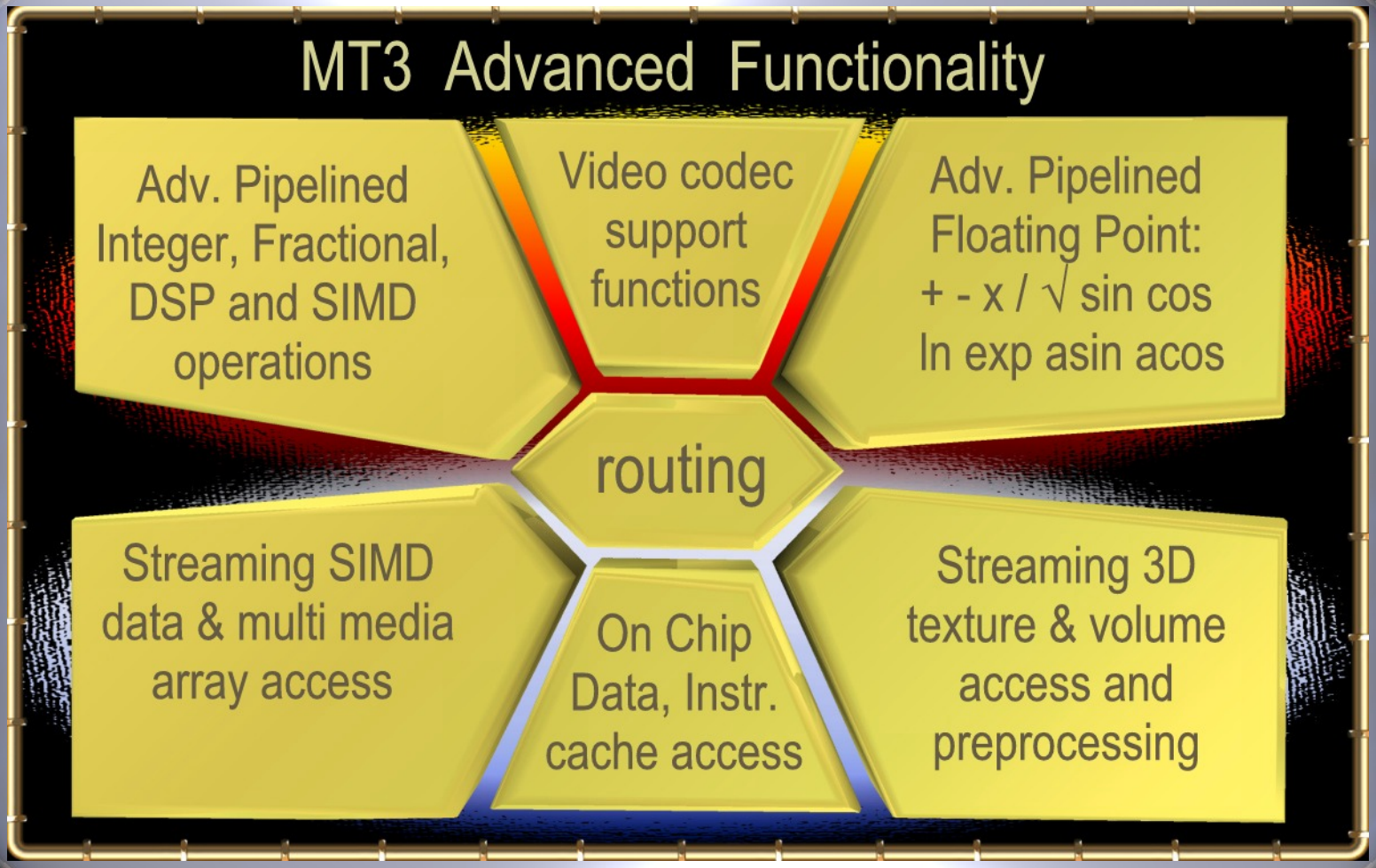
Presentation

GenTera MT processor



Presentation

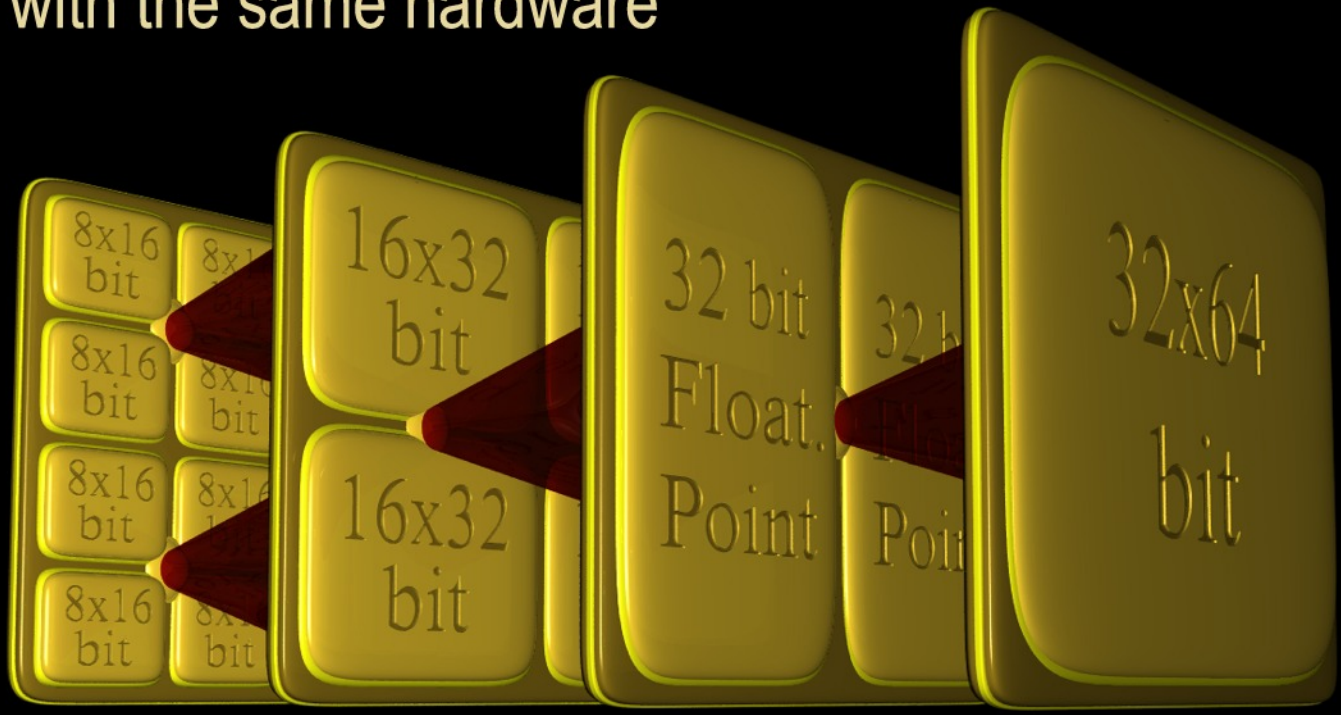
GenTera MT processor



Presentation

GenTera MT processor

The flexible Multiplier handles all Multiplications with the same hardware

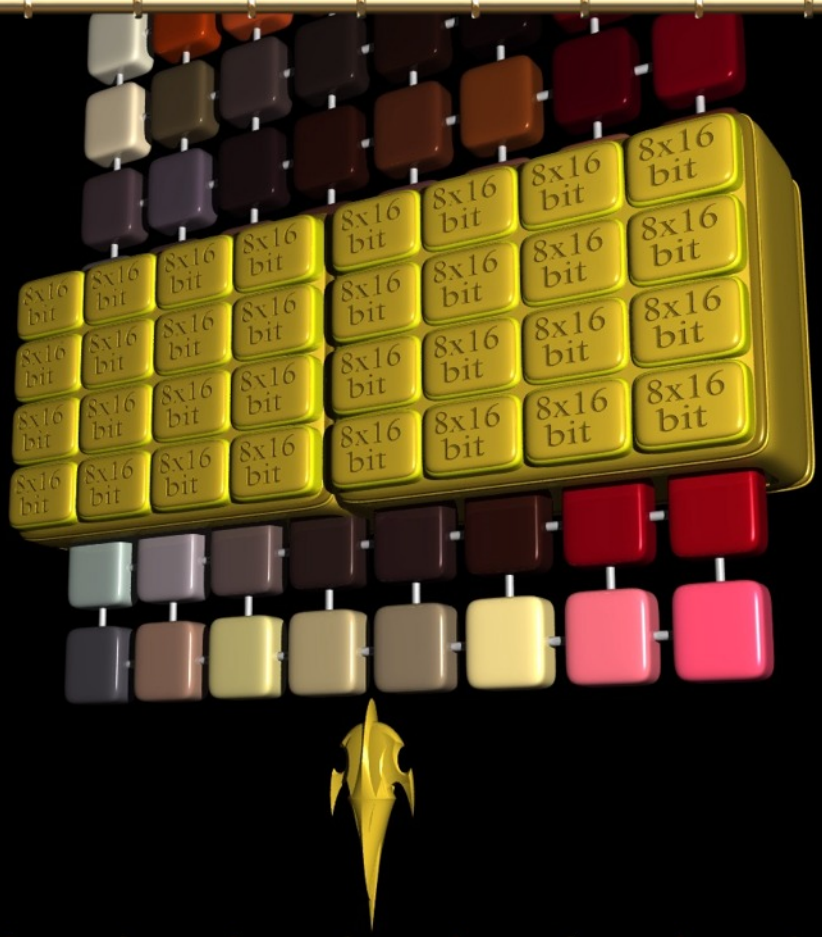


Presentation

GenTera MT processor

Multi Functional Multipliers

Pixel Processing:
8x8 and 8x16 with
16 bit coeficients and
internal vector file.



- 4x4 Matrix x Vector
- Quad Vector Inproduct
- Open GL Blending
- (Vector) Accumulation
- Range Clipping

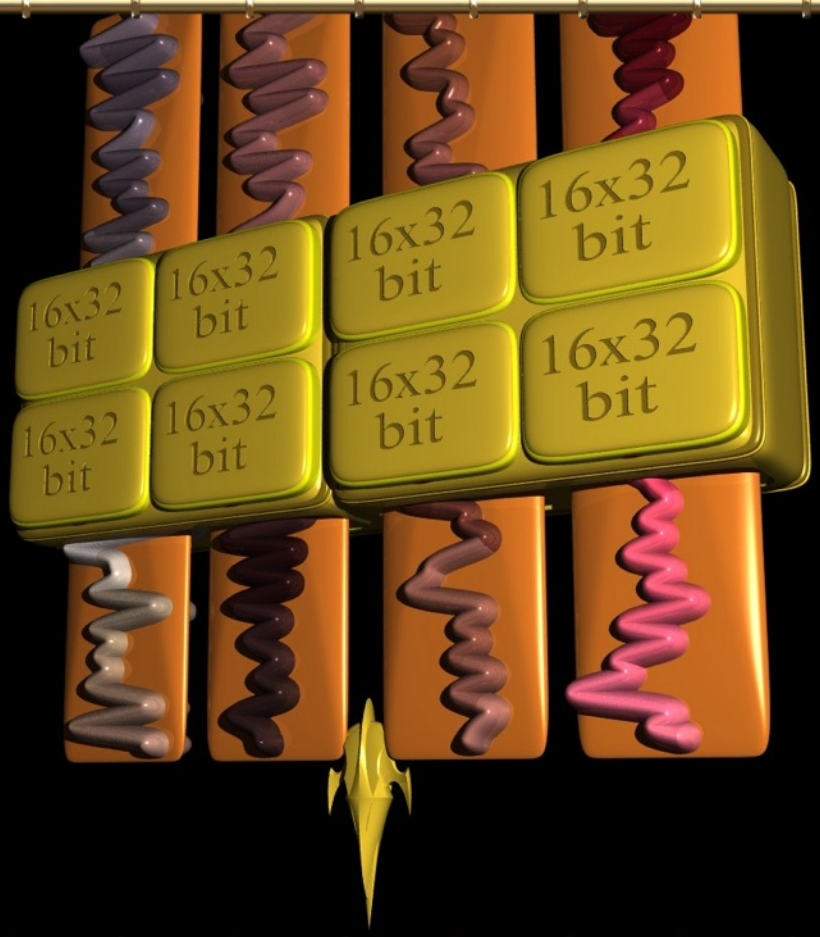
Presentation

GenTera MT processor

Multi Functional Multipliers

Audio and Sonar:
16x16 and 16x32 with
32 bit coeficients and
internal vector file.

- Dot and Cross Products
- Complex Products
- Quad FIR Filter Stages
- (Vector) Accumulation
- Range Clipping



Presentation

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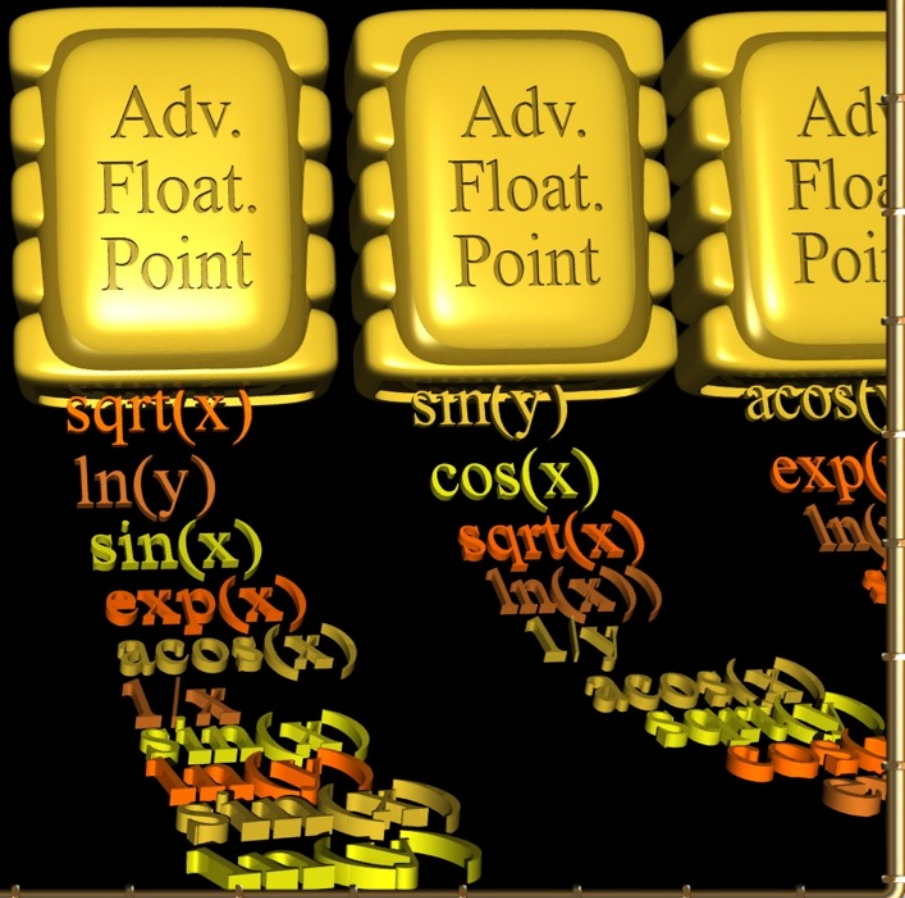
Advanced Pipelined Floating Point

Multiple independent Five stage units can produce floating point results each cycle.

- Reciprocal and Sq Root
- Exponent and Logarithm
- Sine and Cosine
- ArcSine and ArcCosine



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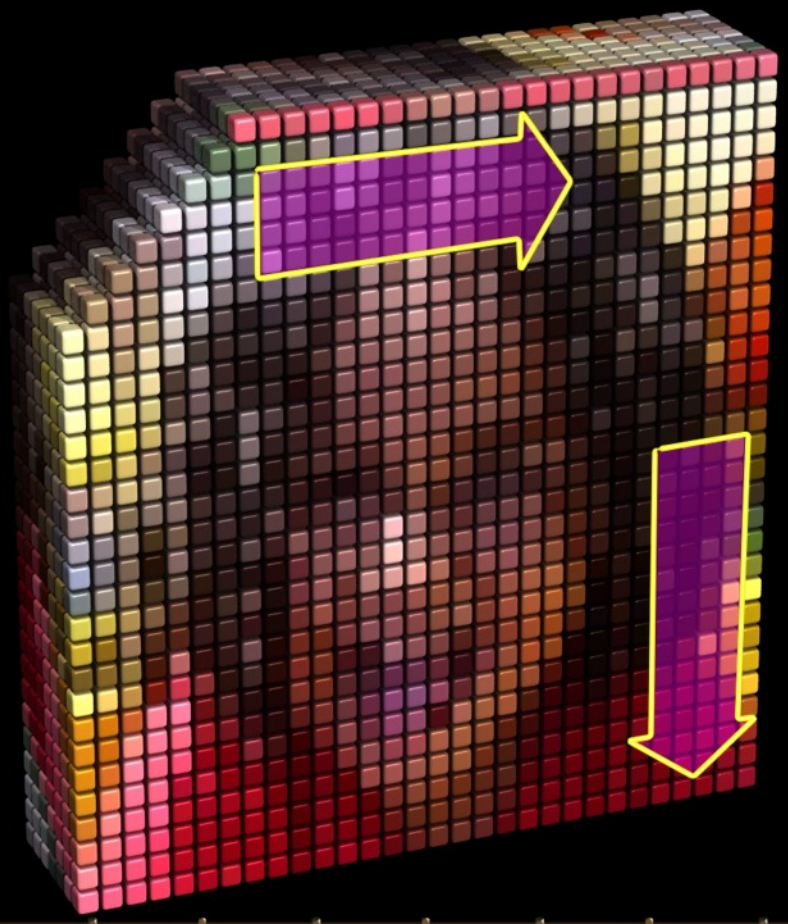
Streaming SIMD data & multi media array access:

Multiple SIMD words per cycle with arbitrary byte address offsets

- 1D, 2D and 3D Arrays
- Horizontal / Vertical
- Read and Write



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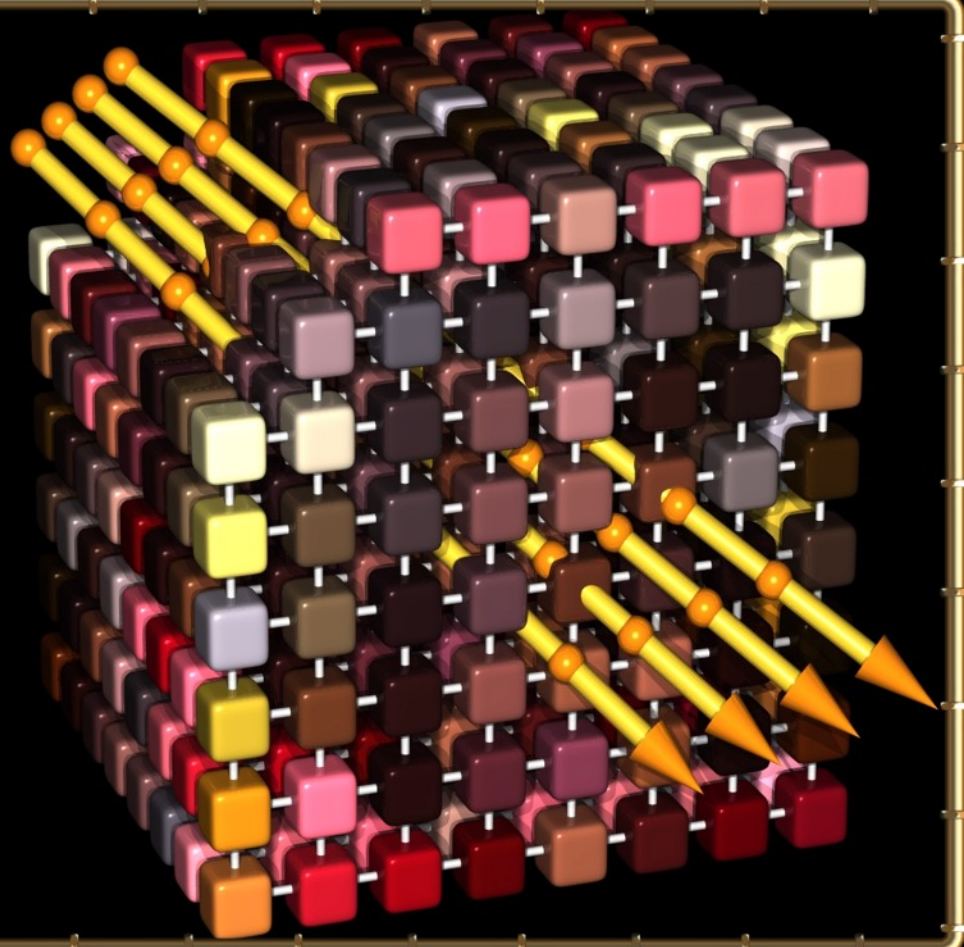
GenTera MT processor

Streaming Perspective 3D texture & volume processing units

Gen. functionality for many applications

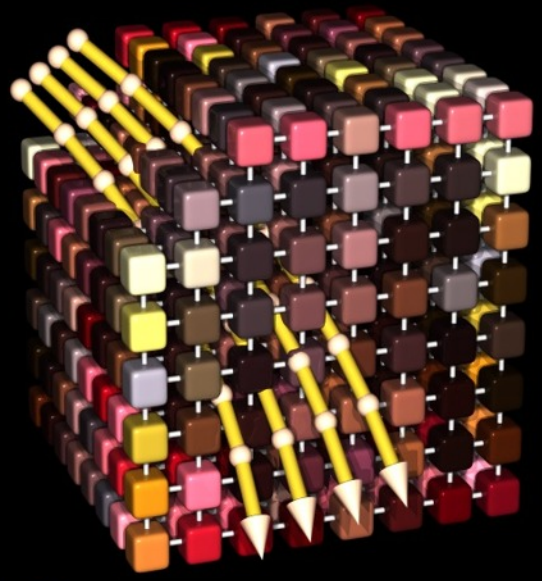
- Fully Open GL compatible
- 32, 16 and 8 bit components



Presentation

GenTera MT processor

Curfed Texture Mapping



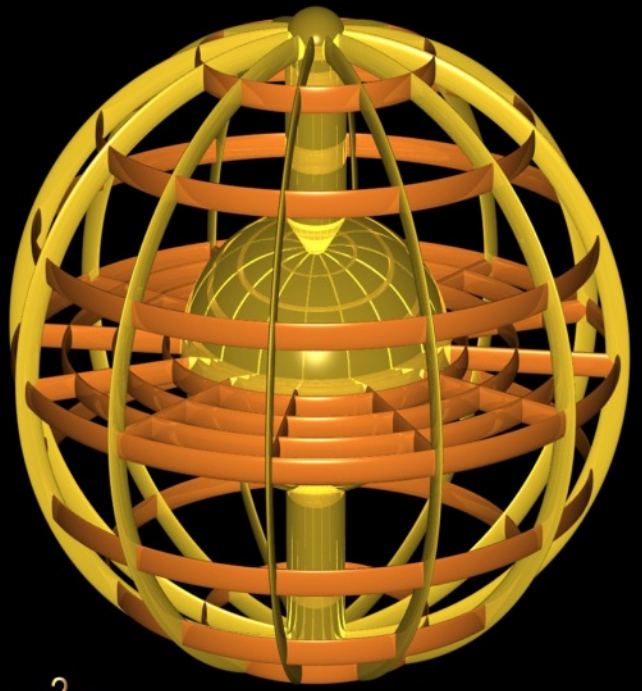
Streaming addresses for the Perspective 3D Texture and Volume units can also come from Advanced Floating Point units or SIMD memory Data

- All Perspective and Lighting operations handled by the 3D pipelines
- All Bi, Tri and Quad Linear interpolations handled by 3D pipelines
- Allows the highest quality graphics without triangle explosion

Presentation

GenTera MT processor

Curfed Texture Mapping & Advanced Floating Point



Example:

- Cartesian to Polar Conversion:
  $X = r.\cos(\varphi)$, $Y = r.\sin(\varphi)$
  one conversion / cycle.

- Polar to Cartesian Conversion:
  $r = \sqrt{X^2+Y^2}$, $\varphi = \arccos(X / (\sqrt{X^2+Y^2}))$
  one conversion / cycle.

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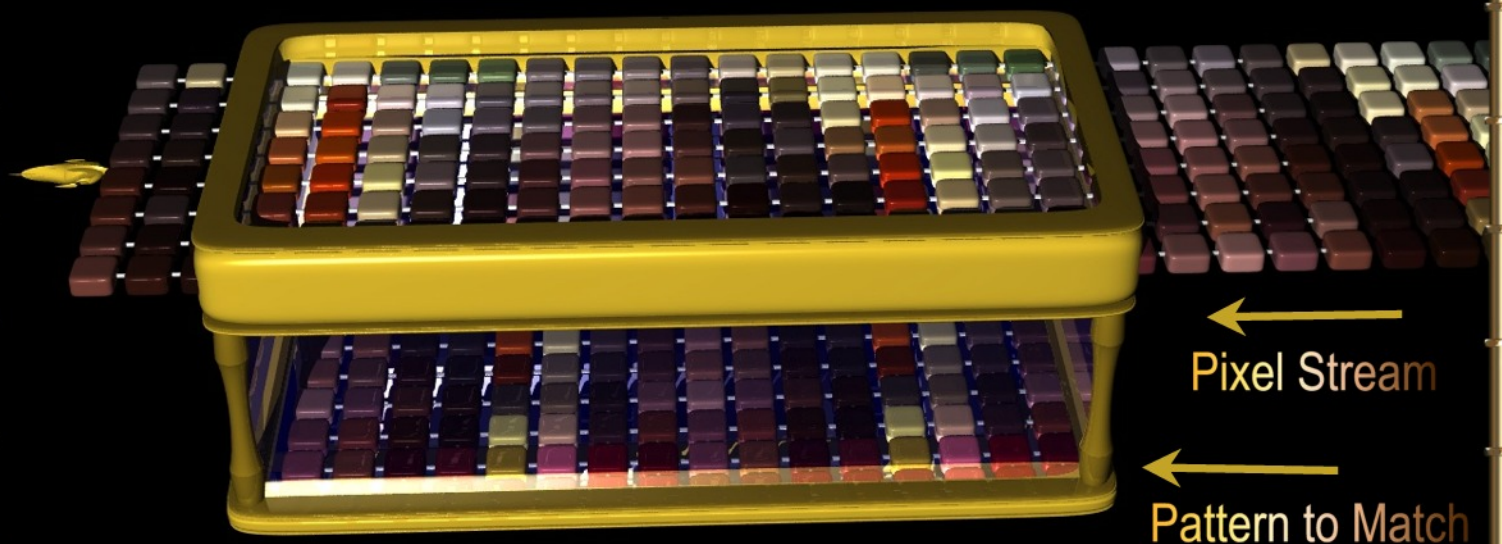
Motion Estimation &
Pattern recognition
MPEG 1....MPEG4

- Compares 128 8 bit pixels /cycle
- MxN kernel size up to 256 x 256
- Search window: 4096 x 4096
- Reduced Search Space Algorithms



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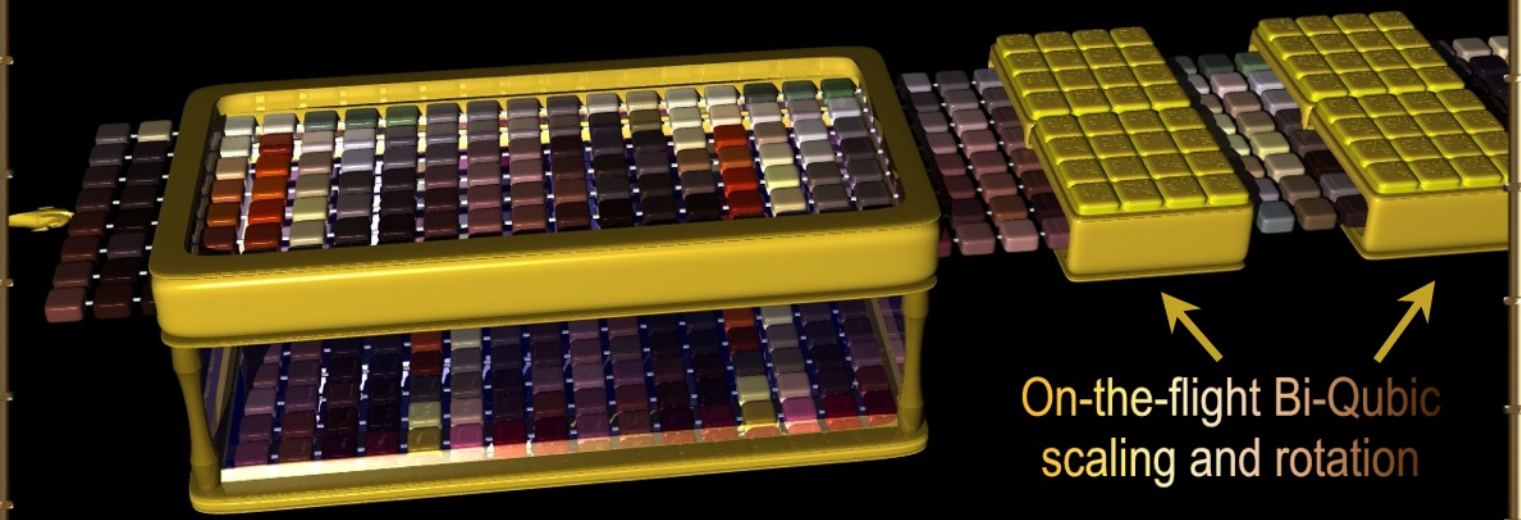
Motion Estimation,
Pattern recognition
in co-operation with
the Multipliers

- Half, quarter 1/8 and 1/16 pixels
- Arbitrary Scaling and Rotation
- High Quality Bi-Cubic Interpolation
- up to 120 million block compares/s



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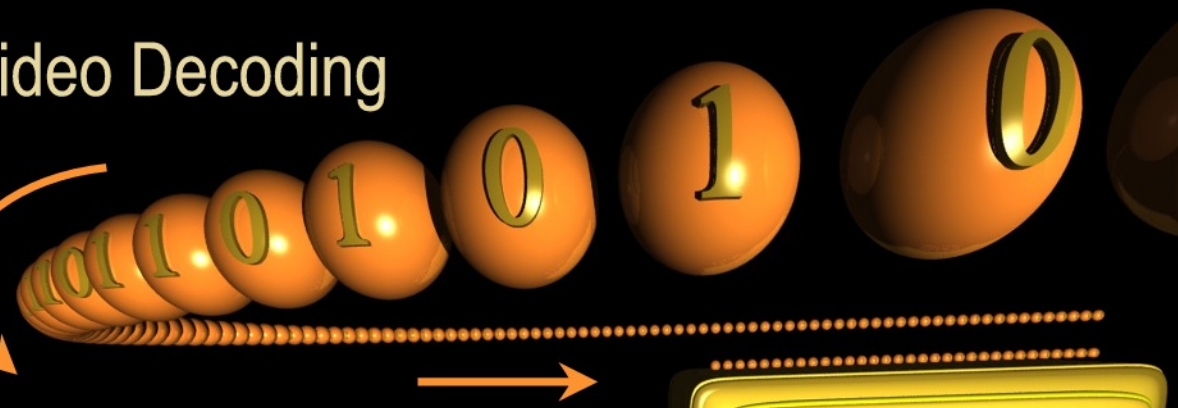
Digital Video Decoding



VLC Bitstream Decoder and
Coefficient DeQuantizer

- Currently for MPEG 2,
- H.261 and MPEG 1
- Bit stream in / Coefficent out
- Next step is the DCT transform

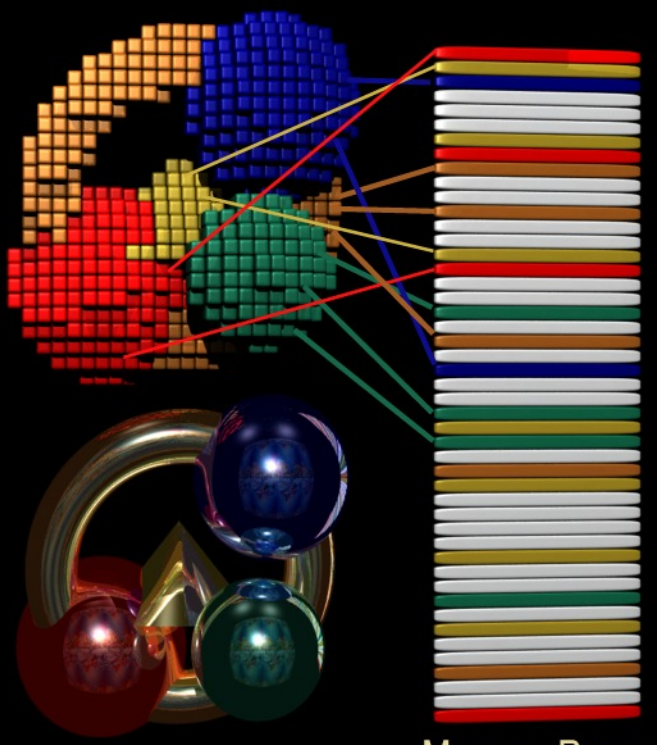
Presentation

GenTera MT processor

Memory management: 1D, 2D and 3 Dimensional

Support for Virtual Memory Management uses 1D Pages, 2D Tiles and 3D Bricks.

- Simple Allocation and De-allocation
- High Memory Efficiency
- Optimizes DRAM access



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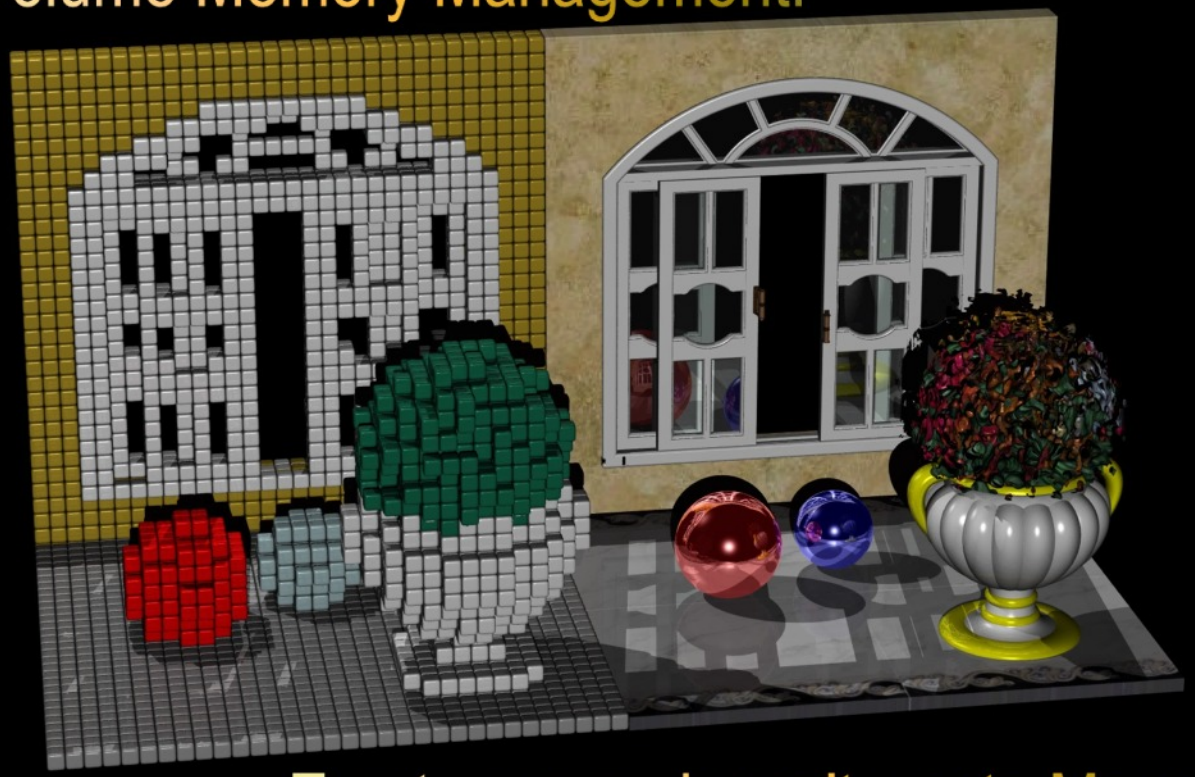
3D Volume Memory Management:



Empty space doesn't waste Memory !

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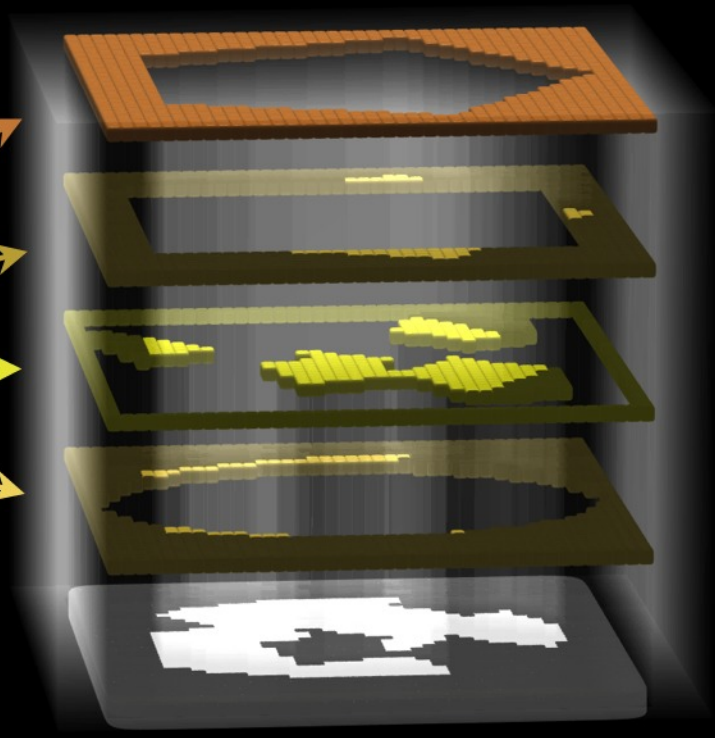
Image Mask Generation Hardware

Pixels written to Memory must pass the :

- The Polygon Mask
- The Window Mask
- The Depth Buffer Mask
- The Auxilary Mask for various extra functions



- Supports the full Memory bus Bandwidth

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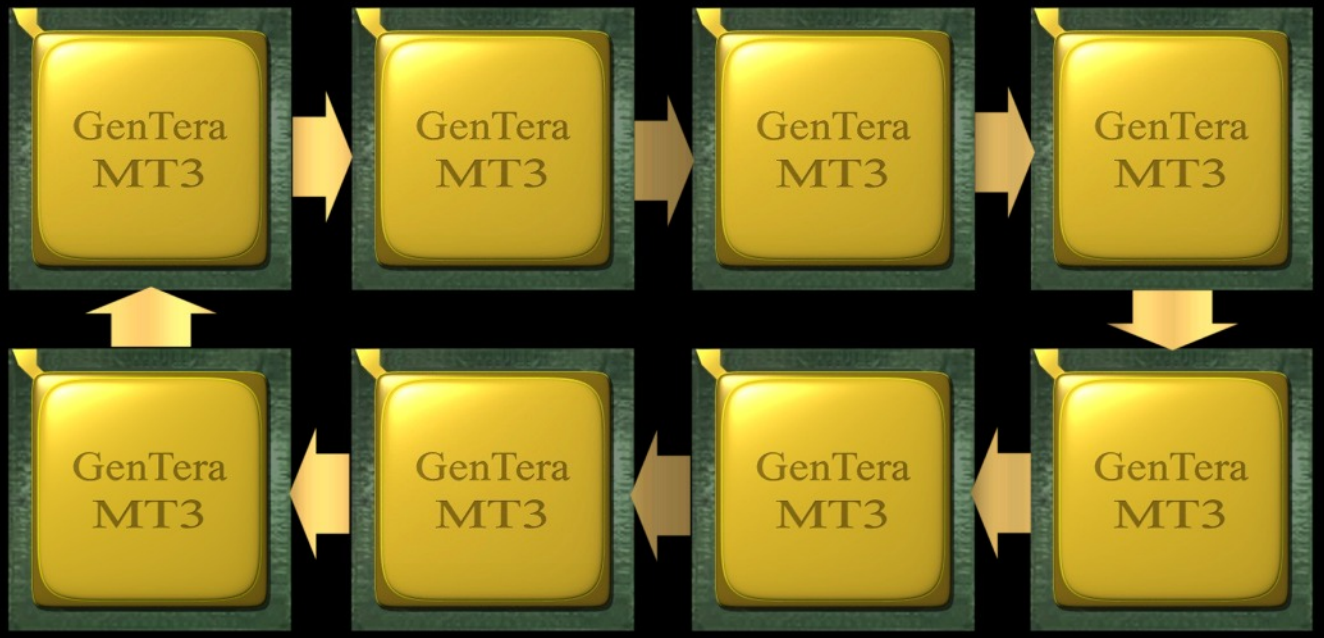
High speed Dataflow ring for Inter Processor
Stream communication, Point to Point or Broadcast



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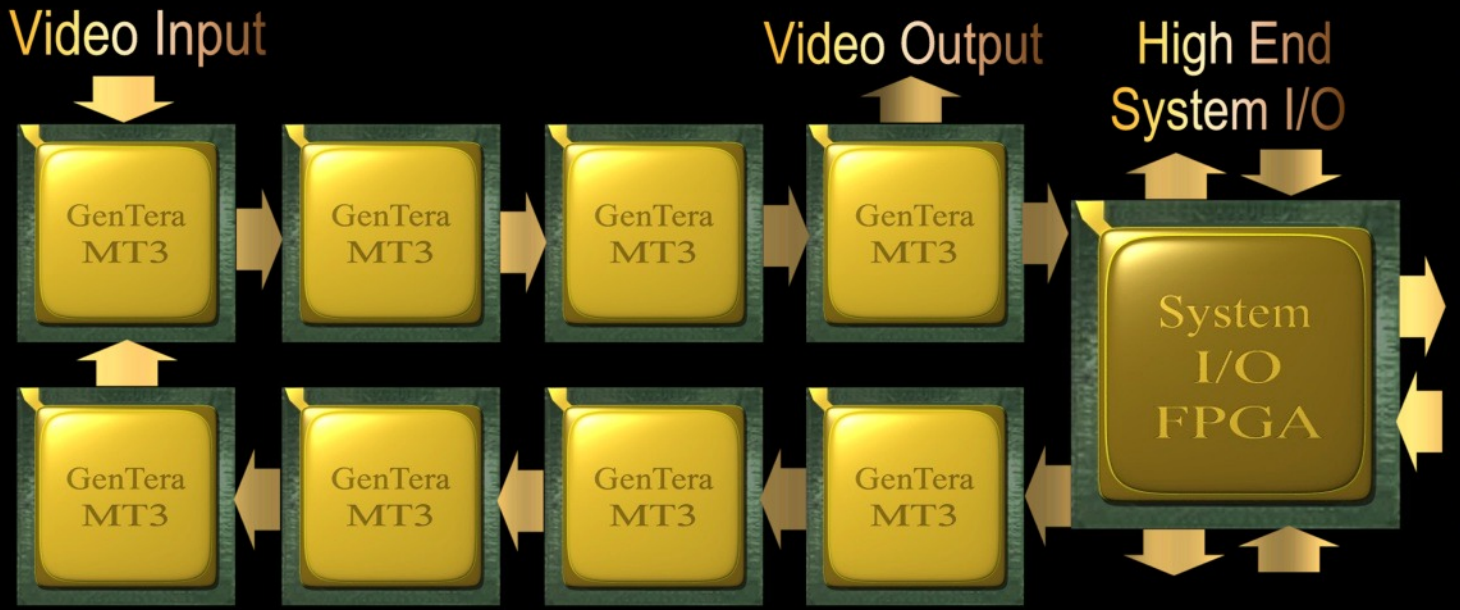
High End system design is enabled by the flexible I/O options



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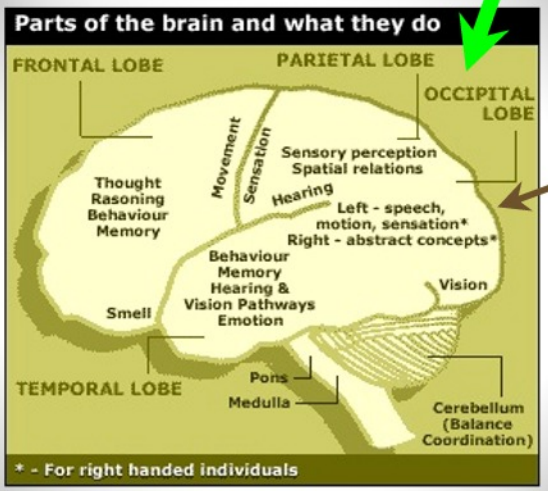
Past

Future

Sony's Asimo



Future applications will use more real world inteligence

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Acqusition

3D Human Face Recognition

Reconstruction

High End applications are being developed today. Expected to grow to a billion chips/year market after 2012

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Face Recognition for Homeland Security

2005: Biometric chips in US Passports and Visa

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2004: Doll Cindy recognizes and speaks written texts to help a child to learn to read and write.

2012: Highly inteligent toys can recognize a child and its mood by its face and facial expressions.

They will be to act and communicate intelligently.

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3D object match

Views generated with
the Graphics Pipelines

and then matched with the "Motion Estimator" unit

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