"In the future, instead of just doing this over a phone call, you'll be able to sit as a hologram on my couch, or I'll be able to sit as a hologram on your couch, and it'll actually feel like we're in the same place, even if we're in different states or hundreds of miles apart." [1] ***Mark Zuckerberg, Facebook CEO.***

AGENDA

< METAVERSE >

< ARTIFICAL INTELLIGENCE(AI) >

< SUPERCOMPUTERS >

Ai & Supercomputers VS Metaverse

EFREM MICKAEL

Image [1] (The Metaverse concept of the future)

METAVERSE

«Its most basic definition refers to "the concept of a fully immersive virtual world where people gather to socialize, play, and work." It is a simulated digital environment that combines augmented reality (AR), virtual reality (VR), blockchain, and social media principles to create areas for rich user interaction that imitate the real world. » Dr. Laeeq (2022) [2]

ELEMENT OF THE METAVERSE

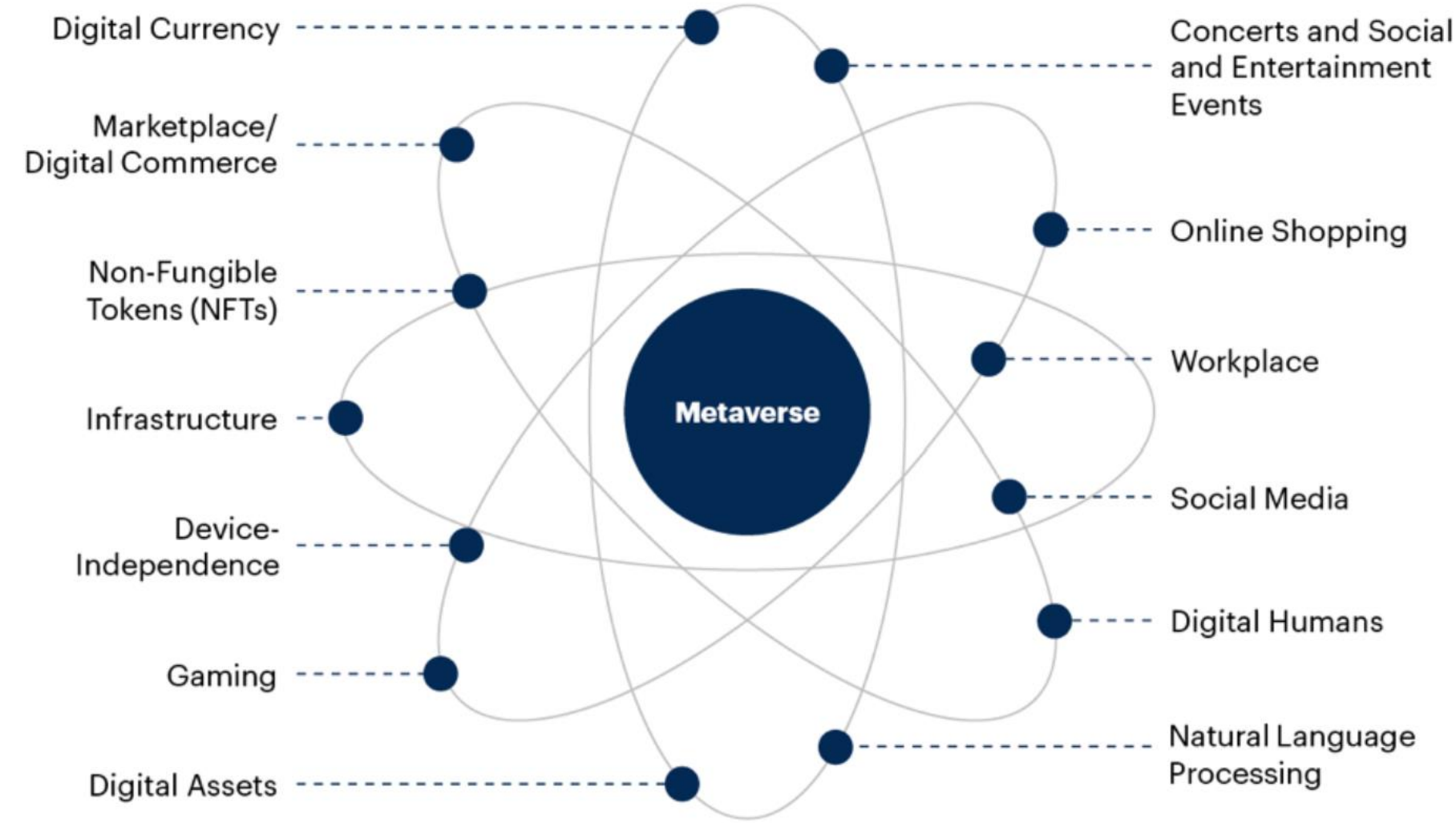

Image [2] (Element of the Metaverse)

Since Facebook introduced their Technology Company in Oct. 2021. The Metaverse has become a hot topic. By the end of 2020, the metaverse market was worth $478.7 billion and is expected to double by the end of 2024. [3]

Top Three Companies Building in the Metaverse & Their Investment

- MICROSOFT

  INVEST: $ 70 billion

- FACEBOOK/ M E T A

  INVEST: $ 10 billion

- ALPHABET GOOGL,GOOG

  INVEST: $ 39.5 million

Data [4]

Meta

Image [3]

Google

Image [4]

Microsoft

Image [5]

INVEST IN YOUR FUTURE

AI SUPERCOMPUTERS

Facebook-parent Meta are building an **" AI supercomputer"** or AI Research Super Cluster & will be fully built by the end of this year. According to Meta: when completed, it will be among the fastest supercomputer in the world.

"…aimed at accelerating AI research and helping the company build the ***metaverse****."*[5]

Meta has already started to use the RSC at it`s current stage to train large models in natural-language processing (NLP).

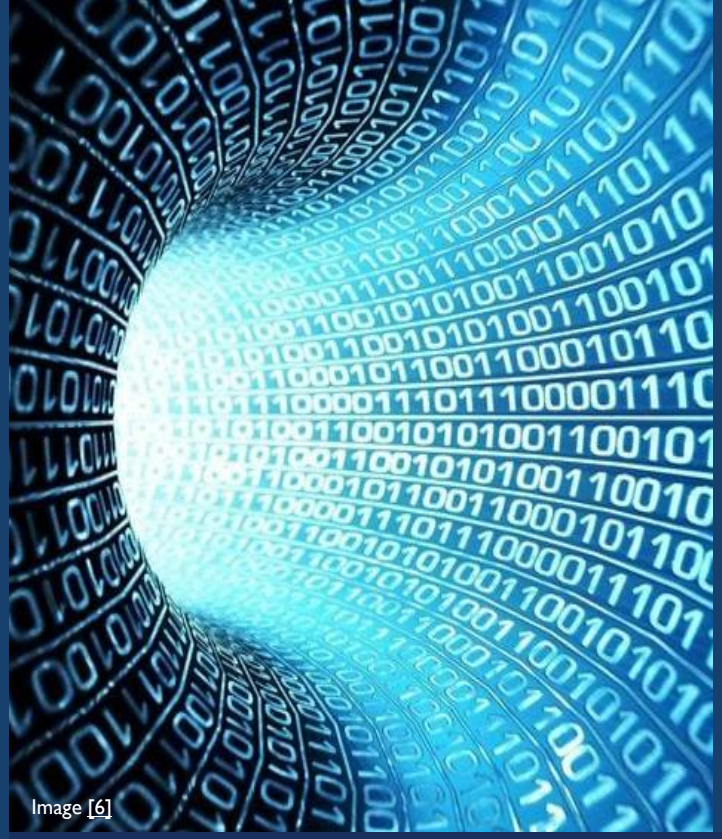

Image [6]

AI Research SuperCluster(RSC)

Meta believes that the RSC will help them build a better AI model that can learn from trillions of example ;Work across different languages, seamlessly analyze text, images and videos at once. [6]

Specification for this new RSC –by the end of this year will be 16,000 Nvidia A100 GPUs with an additional 1,240 DGX nodes . [7]

Image [7]

AI REASEARCH SUPERCLUSTER AND METAVERSE

Image [8]

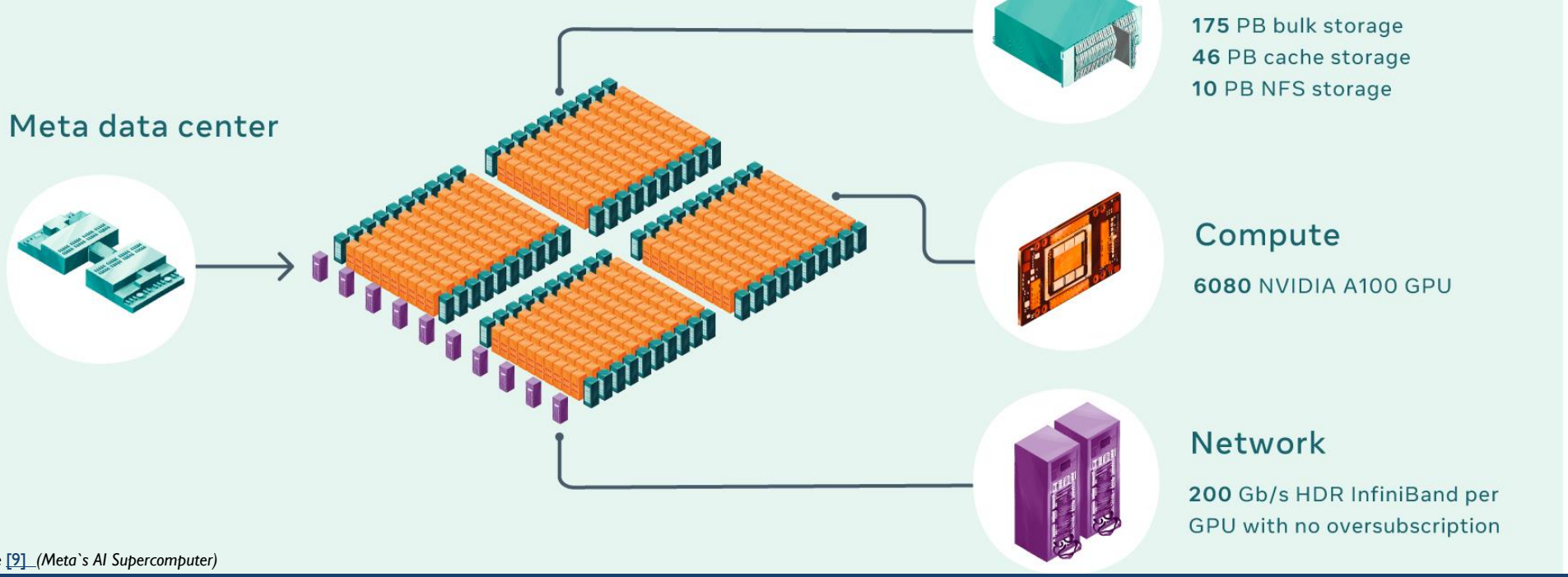

Image [9] (Meta`s AI Supercomputer)

AI Research SuperCluster(RSC)

The AI Supercomputers are built by merging multiple GPUs into compute nodes. which are then connected by a high-performance network fabric, this to allow fast communication between the GPUs.

According to Meta- By the end of this year they will increase the number of GPUs from 6,080 to 16,000, which in theory can help them to increase AI training performance by 2.5 times.

What is the GPU

Or - **Graphics processing unit ?**

The GPU is a processor that is made up of many smaller and more specialized cores. By working together, the cores deliver massive performance when a processing task can be divided up and processed across many cores.

GPU- were originally designed to accelerate the rendering of 3D graphics. But through the years it has become very flexible and programmable.

This helps graphic programmers to create more advanced visual effect and realistic sense with solid lightning and shadow. [8]

GPU:

«…designed to manipulate and alter memory to accelerate the creation of images…» [9]

COMPONENTS OF THE GPU

- **GCA:** The graphics and compute Array also known as a 3D engine, consists of pixel shaders, vertex shaders, stream processors (CUDA cores), texture mapping units (TMUs), render output units (ROPs), L2 cache, geometry processors.
- **BIF:** For interfacing small devices such as flash memory with the processor.
- **PMU:** Is a microchip which controls the power functions. This microcontroller has similar components to the average computer such as CPU firmware, software and memory. This is one of the few components which stays on even when the computer is off.
- **VPU:** A unique processor that takes video streams as input and execute very complex processes on the input stream, Usually used in machine learning applications & devices
- **DIF:** Also called display controller, defines a communication protocol among the host, the source of image data ang the destination.

(Gup components references) [10]

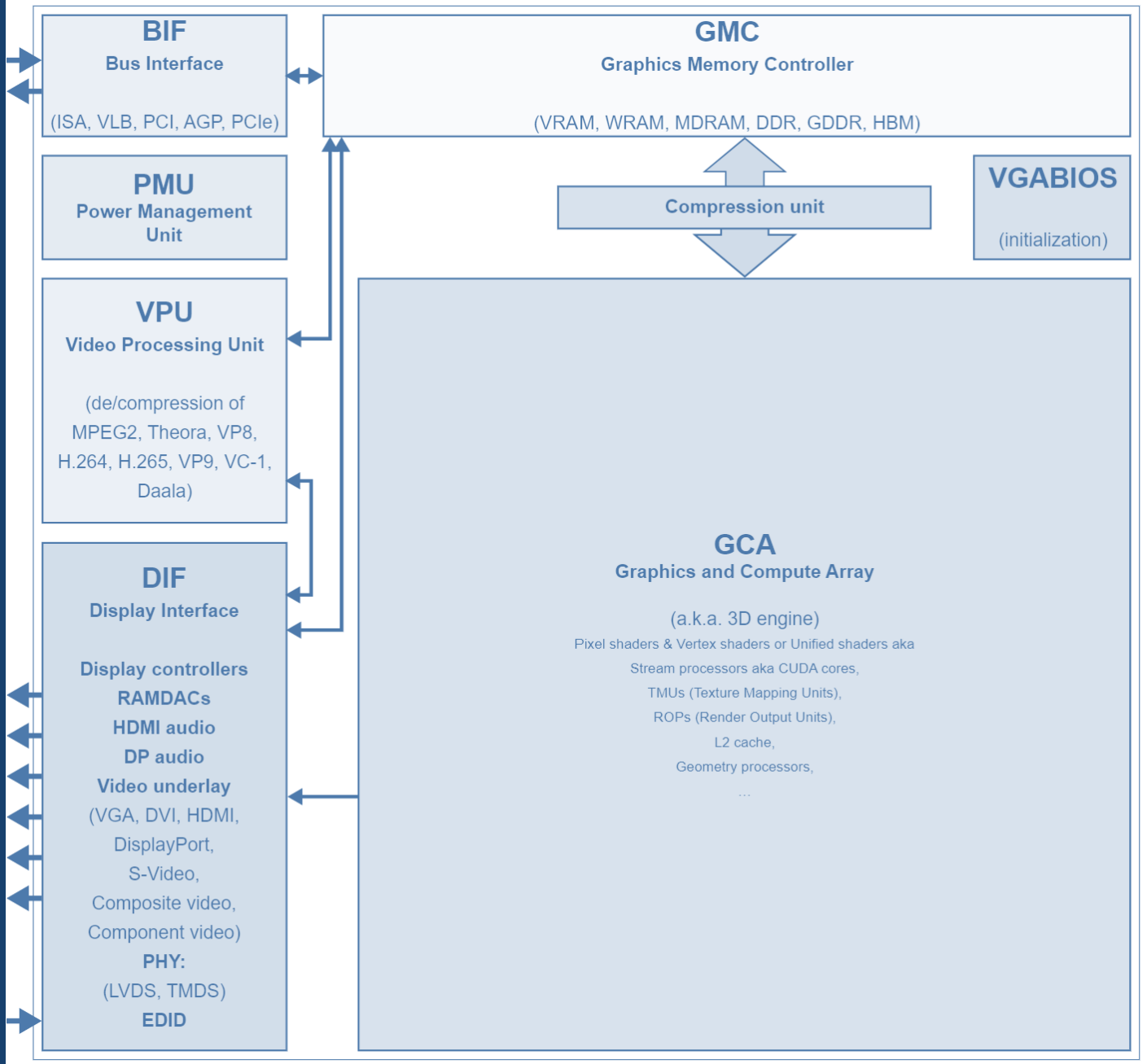

Image [10] *(Component of the GPU)*

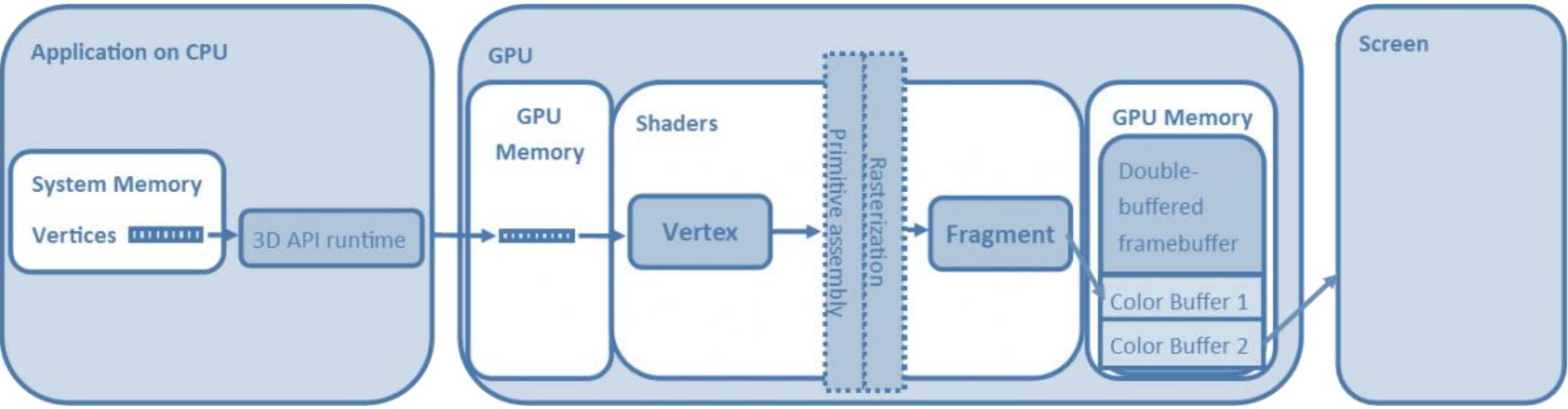

Image [11]

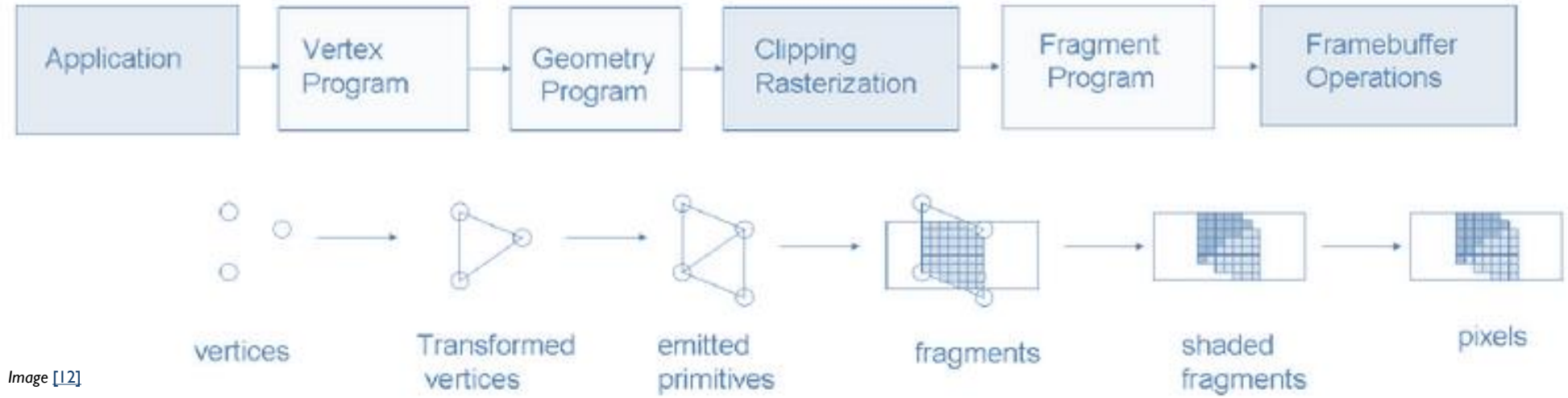

Image [12]

GPU – PIPELINE OVERVIEW

The GPU receives geometry information from the CPU as an input and provides a picture as an output

Input Assembler Stage: Communication bridge between the CPU and GPU.

Vertex program: Is a shader stage, typically performing transformations, skinning, and lighting operations

Geometry program: Here geometry information becomes raster information. *(Raster: data saved in pixels)*

Pixel Processing: Each pixel provide by triangle setup is fed into pixel processing as a set of attributes which are used to compute the final color for this pixel. [11]

AI RSC AS A GROUNDWORK FOR THE METAVERSE

The role of the new RSC in metaverse development:

Intuitive conversations with virtual assistants: Meta is developing a project called CAIRaoke to create a conversational AI into VR.

Meta`s AI-powered recommendations: TorchRec- a library that allows users to create state-of- the-art recommendation systems. The recommendation algorithms serves as the foundation for customization across a wide range of meta offerings and will help personalize experiences in metaverse environment.

AI translation: Meta is working on a universal speech translate, an AI that deliver instant speech to speech conversation across all languages.

AI-empowered creativity: The use of called a Builder Bot. Users by using this AI tool, they can generate 3D content or import objects into a VR world-using voice commands.

Metaverse security: One of the main applications of AI at Meta is to detect and remove harmful/potentially dangerous content. Meta has developed a high technology known as Few-Shot Learner or (FSL), that can act on both new and changing forms of harmful information in weeks rather than month. [12]

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