SDC 20

BY Developers FOR Developers

Storage Developer Conference
September 22-23, 2020

Is Gaming Changing the Storage Architecture Landscape

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AMD

Agenda

- Gaming Overview
- Storage
- Cloud Gaming

Introduction

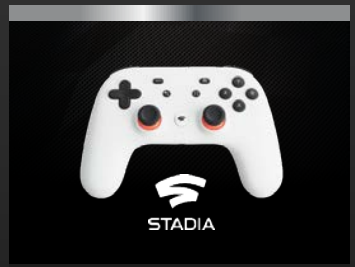
GAMING IS EVERYWHERE

<1 Billion INSTALL BASE AND GROWING

PCs

Macs

Consoles



Cloud

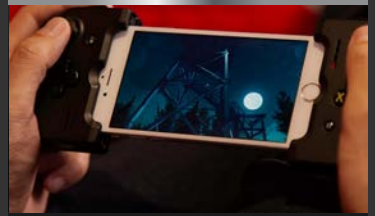
Mobile

GAMERS WANT

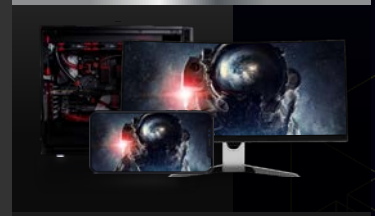
Fast Frame Rates

High Visual Quality

Responsiveness



Social and Streaming



Broad Ecosystem Support

$35.7 BILLION

PC GAMES REVENUE

SOURCE: Newzoo 2019

>$1 BILLION

ESPORTS REVENUE

SOURCE: Newzoo 2019

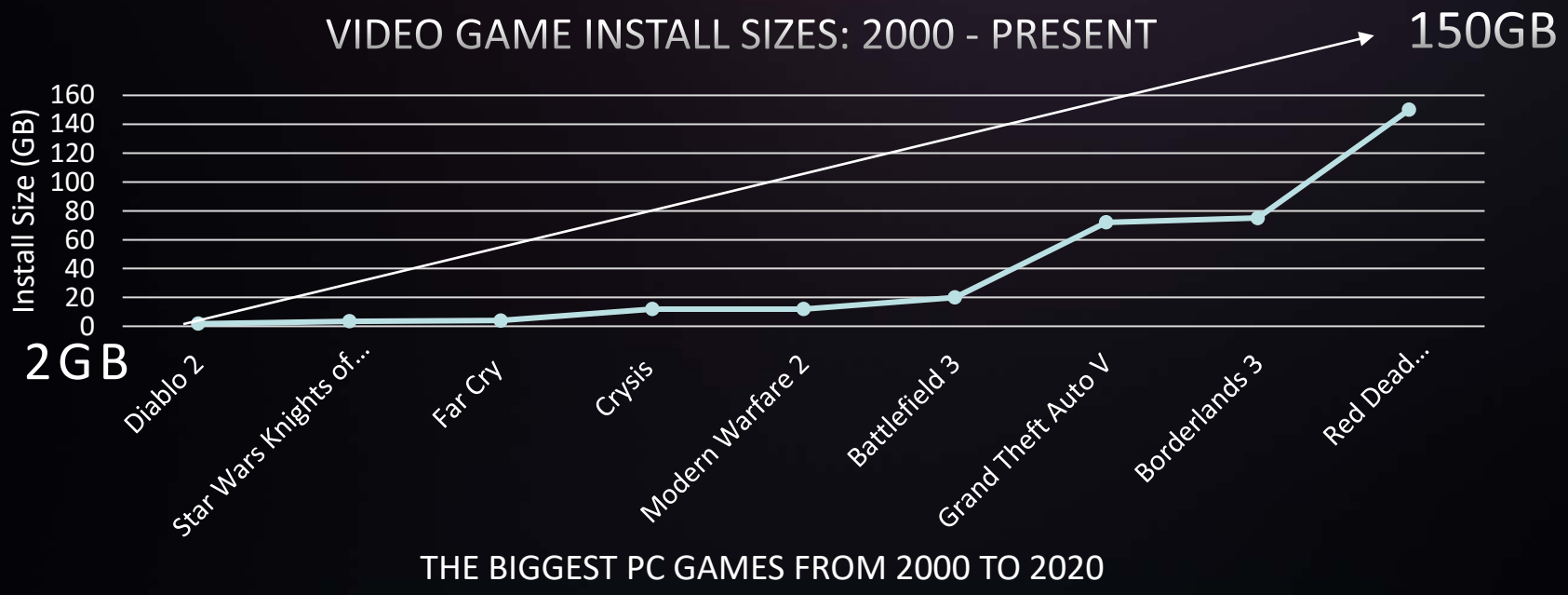
>1 BILLION HOURS

VIEWED EVERY MONTH

SOURCE: Statista 2020

Storage Architecture

MODERN WORKLOADS REQUIRE MORE STORAGE



https://www.systemrequirementslab.com/cyri
https://www.pugetsystems.com/recommended/Recommended-Systems-for-DaVinci-Resolve-187/Hardware-Recommendations

NVME SOLID STATE

STORAGE TECHNOLOGY IN GAMING

LOADING

Faster gaming load times – more time playing and less time waiting!

Increased chance at first strikes

More seamless gaming experience

COOLING

SSDs can reduce the amount of cooling needed for gaming

More energy efficient

Quieter

DURABILITY

SSDs More durable and reliable than HDDs

Longer MTTF

Today's Loading

Dynamic Texture Loading

- Human focus
- Performance degradation
- Fetching texture w/o blowing up DRAM

Error Recovery Flow

- Reliability
- Checkpoints & Instruction level Faults

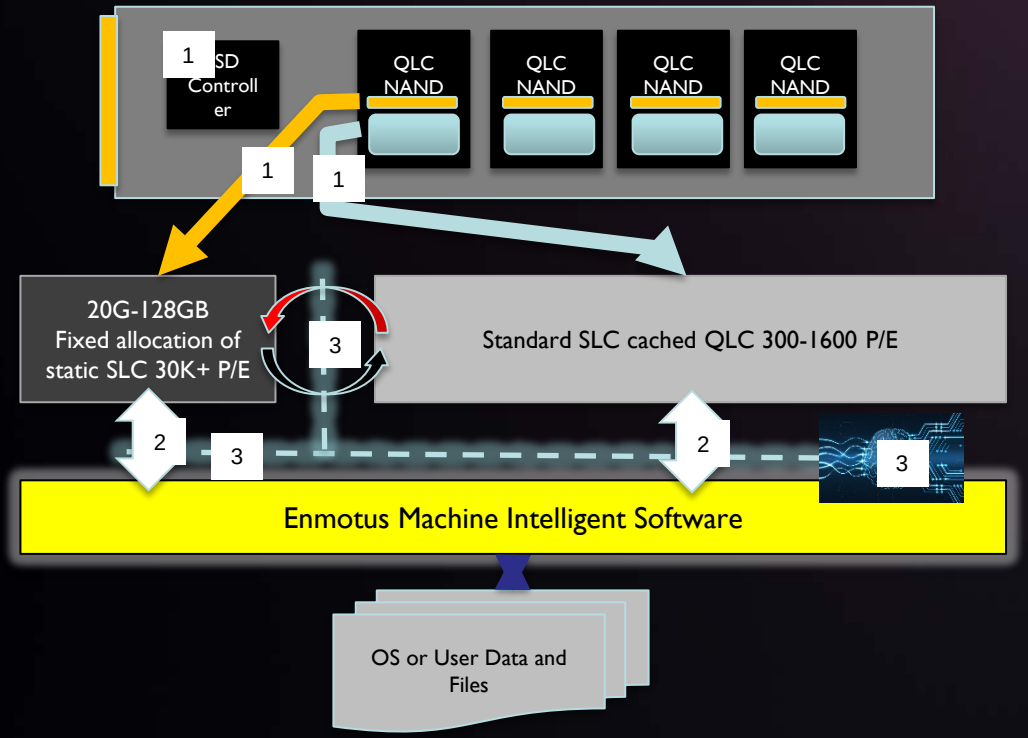
Compression

- Reduce the size of built assets
- Optimize data path and bandwidth
- Effective Capacity Optimization

New Storage Architecture for Gaming

- Tiered storage with Gaming AI
- Computational storage
- More sophisticated compression
- RAID 10

Tiered SSDs w/ Gaming AI

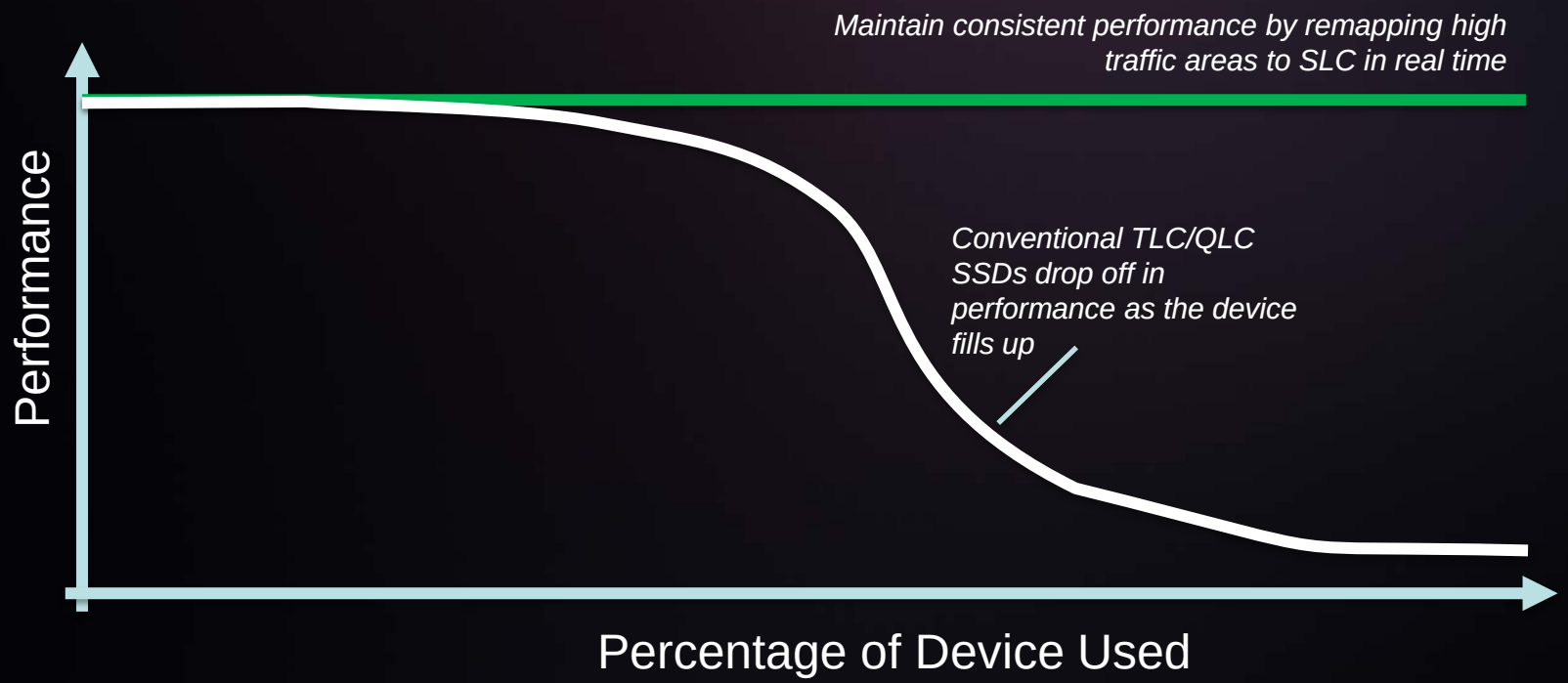


1 SSD NAND is divided into two pools: SLC and QLC by the SSD controller firmware

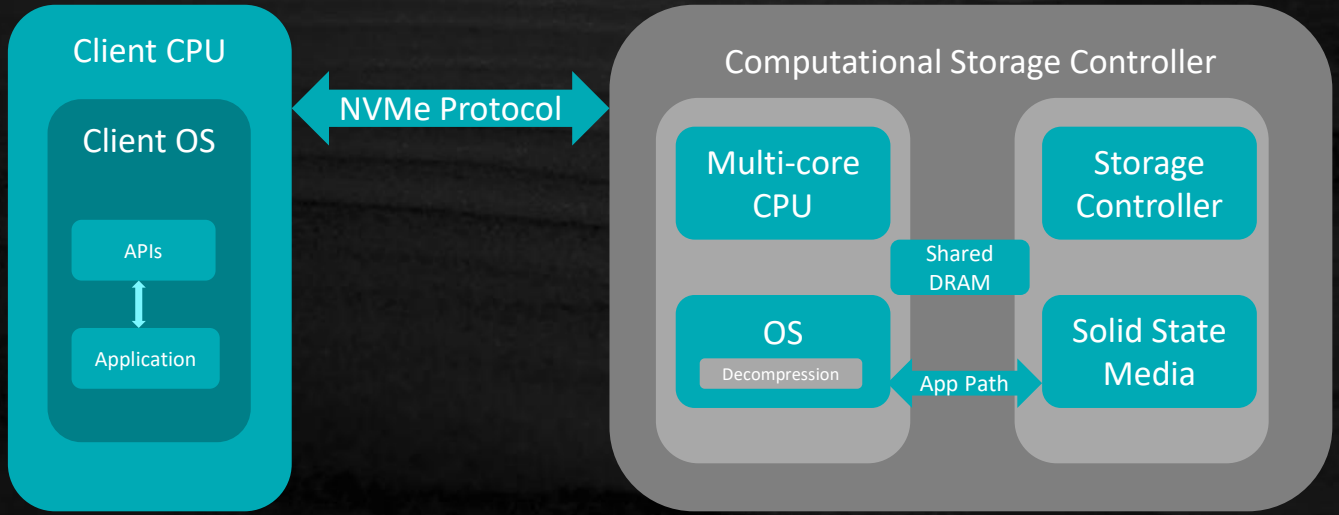
2 Gaming AI software has DIRECT access to the two types of NAND flash:
- SLC = high performance and endurance
- QLC = high capacity, low endurance

3 Data is intelligently and continuously balanced across SLC or QLC by Gaming AI software
- Heavy traffic => SLC
- Light traffic => QLC
- SLC is smart provisioned on the fly

Maintaining Consistent IO Performance



COMPUTATIONAL STORAGE BASIC ARCHITECTURE



Single-chip solution reduces latency and improves results

Cloud Architecture

CLOUD GAMING

GOOGLE STADIA & MICROSOFT XCLOUD

LOCATION

The console or “box” lives in the data center.

Access your game console from any device

Google deploys ‘gaming servers’ w/ AMD cloud-optimized datacenter GPUs

Microsoft literally has consoles in Azure datacenters w/ AMD cloud-optimized GPUs & RyCPUs

ON-DEMAND

Similar to video on demand – A series of compressed video frames

But video is reacting to the gamer’s imputs at 20-60 frames per second.

Game is stored, executed, and rendered by the service provider

Video is streamed directly to the enthusiast’s computer, console or mobile device

Leaving Peer-to-Peer Gaming in the past

Creators changing how games are created

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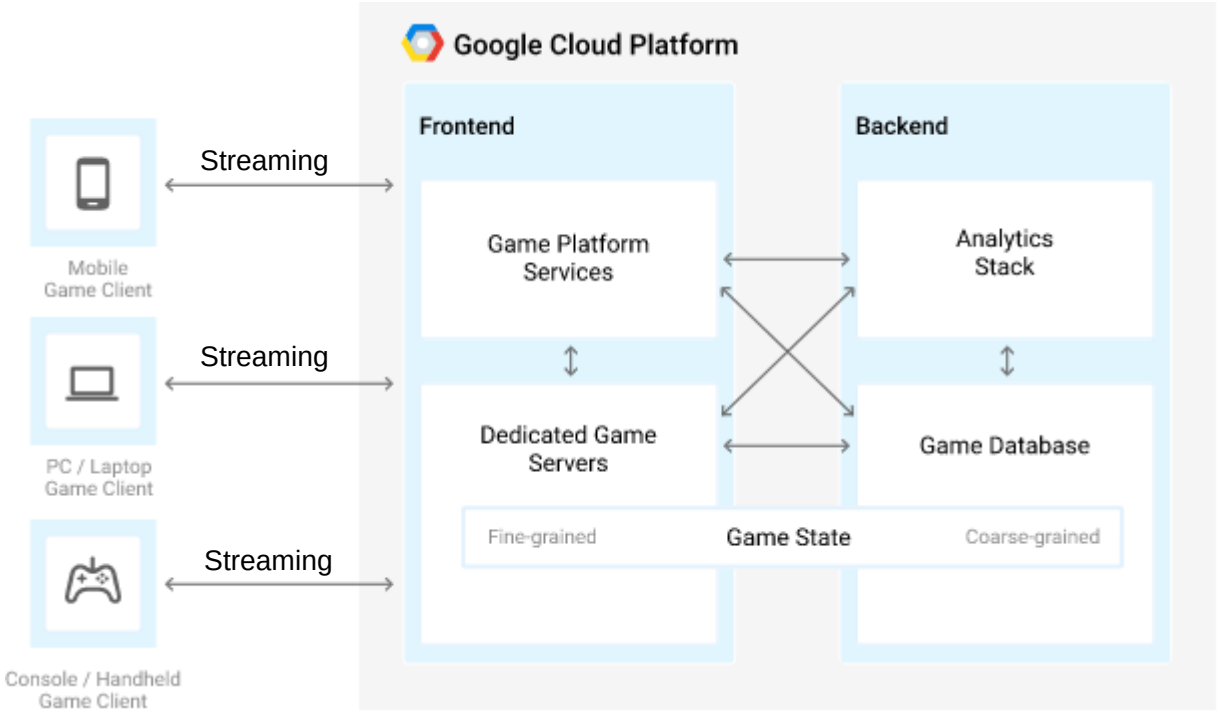
- On-Demand Gaming
  - Steaming
  - Loading on-demand – fetch data as needed without ‘blowing up’ DRAM
- Ray tracing – Extra level of realism
- Human focus Factor - peripheral drop in detail
- Cloud Gaming Data Compression

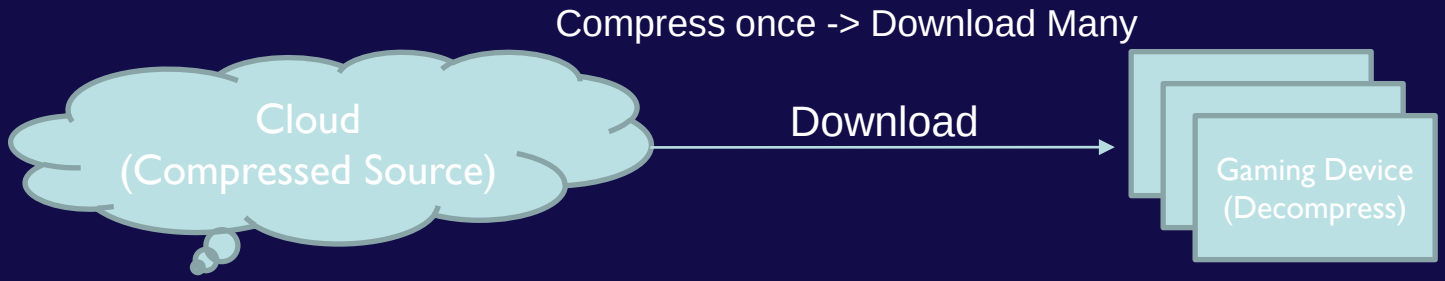
Google On-Demand Cloud Gaming



https://cloud.google.com/solutions/gaming/cloud-game-infrastructure

Cloud Gaming Data Compression

- Lots of time spent waiting for downloads to finish
- Downloads
  - gaming servers with CDN or edge services
  - Performance depends on bandwidth and a good compression algorithm
  - Compression ratio and decompression speed is key
    - A stronger compression algorithm will aid in decompression speed
  - Computational storage could accelerate decompression rates for faster game play on devices



Loading Solutions Considerations

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Direct storage APIs

- Compression
- Dynamic Loading

Optimize

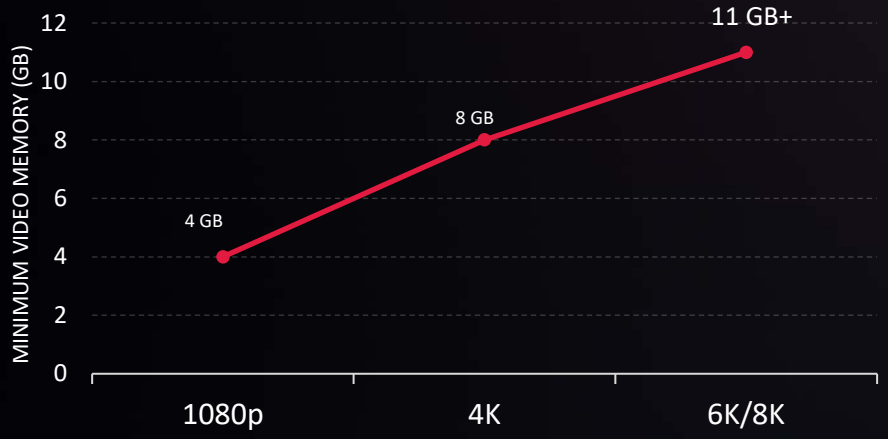
- Error Recovery Flow
- Garbage collection algorithms
  - Dynamic caching – doesn't work well for gaming, impacts reload times
- Reloading issue

MODERN WORKLOADS REQUIRE MORE MEMORY

CREATION

REQUIRES MORE MEMORY

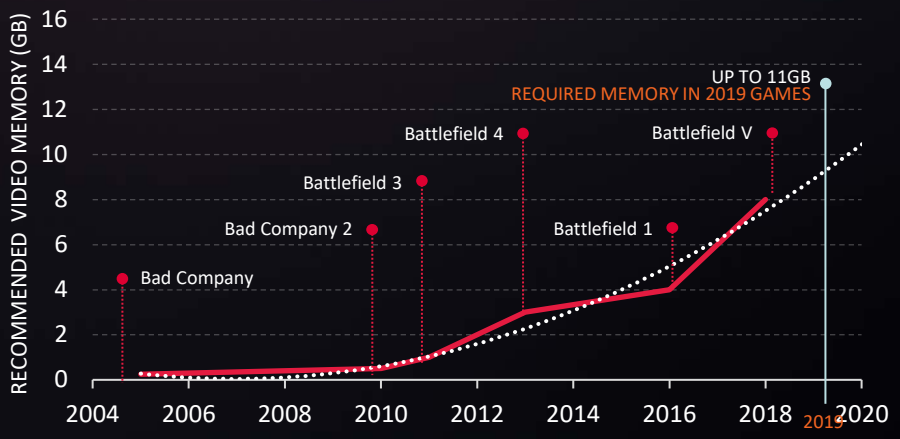
DAVINCI RESOLVE



GAMING

REQUIREMENTS ARE RISING

BATTLEFIELD SERIES



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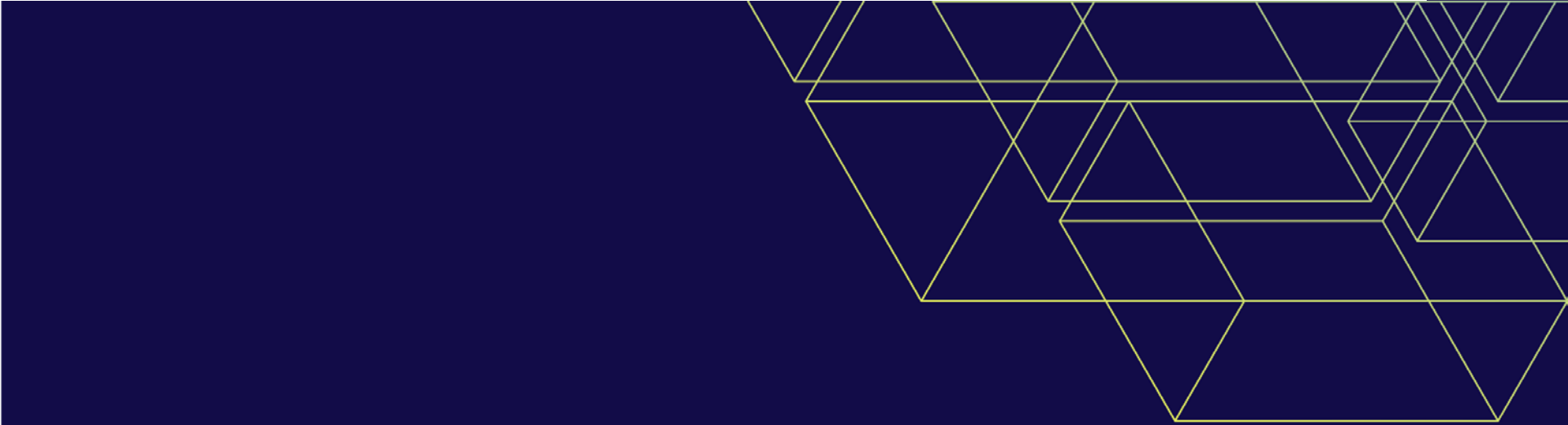
2020 is the year of the Gamer

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