泛在计算与案例分析

Web前沿技术论坛

奥运制播：技术的召唤

专业媒体制作领域

- 专业媒体制作相关场景，例如： 本地化, 无障碍 essence 再创作, 质量监测 (QC), 制作, 量产
- 万维网技术应用于专业媒体制作场景：WebGPU、WebGL、WebAssembly、WebCodecs、WebRTC、Encoded Media、Web Audio 等

https://www.w3.org/2021/03/media-production-workshop

媒体娱乐创意生产领域

- 影视内容创意策划与编排流程
- 互联网虚拟技术对前期和后期制作的影响
- 互联网关键技术：影视工业人才，成本以及在虚拟世界摄制等影响
- 在线制作与VFX视频特效


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USE CASE 1: UL
商业技术案例1：大上行

- WebRTC is not very suitable for Uplink streaming. Developers use the traditional RTMP method.
- WebRTC不是万能药。研发、生产、商业项目中大上行对Web业务有挑战。开发者只能依赖于RTMP等传统技术栈。

- HLS as the Downlink streaming, WebTransport
- HLS作为下行手段。WebTransport能否解决问题?

- Unable to transparently transmit H.265 video, leading to use WebSocket and to implement varied proprietary methods
- 困难：无法透传MPEG H.265，依然采用WebSocket和发展私有协议

- WEAK NETWORK: The adaptive mechanism does not have developer-friendly flexibility; Not all scenarios have the priority for lower latency, some need high-quality video
- 弱网：适配机制不具备开发者友好性；标准制定有遗漏？仅考虑低时延要求，对高画质要求无选项

USE CASE 2: COMPL.TASK - STREAMING
商业技术案例2:复杂任务的流处理

- Complex tasks such as ChatGPT and AIGC, the user waiting time can reach 50–150 seconds
- ChatGPT和AIGC类复杂计算任务，Web用户等待时间50–150秒

- The waiting time is too long. There is a streaming mechanism (40% of the generation is rendered first, and the remaining 60% can be expected)
- 即使已改进，但是否有更优Web流处理方案?（40/60原则）

- Example: flexible application of streaming mechanism brings high experience

- Acquisition. No intention to introduce into W3C and community. The mechanism could be helpful for web developers. (existing web spec. Pipeline?)

USE CASE 3: COMPL.TASK DISTRIBUTION – Intro.

WebGL/WebGPU distributed rendering is a distributed 3D rendering technology, similar to grid computing, which allows multiple computers or devices to work together to complete complex 3D rendering tasks. In distributed 3D rendering technology, each computer or device can become a node. Data exchange and communication between nodes can be carried out through a central node to jointly complete the graphics rendering task.

Ex.: Unity application renders in the cloud. It splits the rendering task and schedules it to multiple GPU devices to render and merge the rendering results, and finally pushes the rendered image to the user through the video stream.

Distributed WebGL/WebGPU technology can be applied to fields requiring high-performance graphics rendering, such as virtual reality, game development, scientific visualization, architectural design and other fields. By distributing rendering tasks to multiple computers or devices and making full use of GPU resources, you can accelerate the speed of graphics rendering, improve the quality of rendering, reduce the load on a single computer or device, and improve the reliability and stability of the system.

USE CASE 3: COMPL.TASK DISTRIBUTION - Facts
商业技术案例3：分布式对复杂Web任务的应用现状

WebGL/WebGPU

Due to limited terminal hardware resources, it is impossible to run large 3D applications on the Web or the runtime performance is poor. The common practice is to cloud 3D applications on remote servers through virtual machines or application containers, then transmit video streams, and finally present them to the front end through

WebRTC/WebTransport and other technologies.
The cost of 3D application cloudization is high, and it relies on heavy components such as WebRTC, which makes network deployment more troublesome and more suitable for ultra-large applications. For small and medium-sized applications, the ROI is relatively low.

USE CASE 3: COMPL.TASK DISTRIBUTION – GAP ANALYSIS
商业技术案例3：复杂任务分布式模型

差距分析和标准化思路：

❑ node discovery, registration and task scheduling

Each node can register the current machine GPU hardware information, load status, etc. to the central node. Each node can initiate tasks and then be scheduled by the central node.

Note: GPU hardware information acquisition involves privacy information, which is not supported by the current browser.

❑ WebGL/WebGPU rendering split

Currently, the GPU pipelines supported by WebGL/WebGPU include Render Pass and Compute Pass. Only native GPU can be applied. Consider supporting Distributed Render Pass and Distributed Compute Pass, scheduling expensive rendering and computation to other machines for collaborative rendering and computation, and finally merging the rendering results and rendering them to the browser.

USE CASE 4: Ubiquitous Computing
商业技术案例4：泛在计算模型

Clould–edge–mobile coordination explainer
Ubiquitous computing

- Large internet enterprises are designing proprietary solution for in–house micro–service platform; WASM/JS/Deno computing models have lower awareness.
- Proprietary product will be used for the runtime of its own business deployment; benchmark: CF and other products

USE CASE 5: NetInfo
商业技术案例5：跨层研究的创新，服务与Web开发者

- Example: L4S

- 3GPP, IETF, W3C
Developers need a practical and end-to-end solution, rather than technologies implemented in different standard bodies; W3C is the place to expose developer-friendly interface to dig out the NETWORK functions (UL/DL, signal strength in data field, congestion statics data field)

USE CASE 6: Web 3
商业技术案例6：Web3去中心化身份识别、事务型数据中心

- Background: Web3 is the future Internet based on the decentralized blockchain, and in the blockchain, all read and write transaction data are recorded in a distributed ledger. Due to the characteristics of the blockchain's multi-center, distributed and multi-party consensus mechanism, hard to query and analyze transactions.
- Web front-end: based on the html tag attribute of the user DID (Decentralized Identifier) web front-end, route the user's transaction data cache center [DID is built by the distributed blockchain network node, and the DID generation node is responsible for caching the transaction data of the corresponding user DID]
- 基于用户DID（Decentralized Identifier）web前端html标签属性，路由用户的交易数据缓存中心【DID由分布式区块链网络节点构建，DID生成节点负责缓存对应用户DID的交易数据】

- User transaction data cache center: build user blockchain transaction data index based on user DID generation center, which can improve the efficiency of data query and analysis, and support faster data query. 基于用户DID生成中心建立用户区块链交易数据索引，可以提高数据的查询和分析效率，支持更加快速的数据查询。


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