QUESTIONS FOR EXAMINATION
LECTURE „ADVANCED WEB TECHNOLOGIES“ (AWT VL)
WINTERSEMETER 2023/2024

Web Technologies Basics & Media Entertainment for the Web

1. What is the purpose of Domain Name System (DNS)?
2. What is the WWW? Identify relevant technologies / standards for the WWW architecture.
3. What is W3C?
4. Explain the concept of “dynamic Web (pages)”?
5. Name Client-Side technologies for Web Application development.
6. What is the difference between Service und Web Workers?
7. What is the purpose of JavaScript? Name and explain some APIs?
8. What is the minimal requirement to play an MP4 video on a Web page?
9. What is the minimal requirement to play adaptive bitrate video on a Web page?
10. Which APIs are useful to develop a Game for Browser?
11. Which API can be used to access Camera or Mic?
12. List Web APIs for communication?
13. What are the main elements required for establishing WebRTC communication?

Multiscreen Technologies and Standards

1. Which Technology can be used to mirror a Smartphone screen on a large display?
2. For what stands the abbreviation SSDP?
3. For what is SSDP useful?
4. For what stands the abbreviation UPnP?
5. Which technology uses UPnP for Device Discovery?
6. What are the Layers of UPnP?
7. What is the format of UPnP Device/Service Description?
8. Which technology can be used to launch an App on TV e.g. from a mobile device?
9. What does the abbreviation DIAL stand for?
10. Which technology uses DIAL for Device Discovery?
11. What are the main features of Airplay?
12. Which technology uses Airplay for Discovery?
13. Which technologies can be used to pair devices not in the same network?
14. Which communication protocol allows direct communication between web applications?
15. Which communication protocol allows bidirectional communication between client and server?
16. What is W3C Second Screen Presentation API?

HbbTV and Smart TV

1. For what stands the abbreviation HbbTV?
2. What is HbbTV? How does it work?
3. What is a broadcast-related app?
4. What is a broadcast-independent app?
5. What are the main new features in HbbTV 2.0.1, HbbTV 2.0.2, HbbTV 2.0.3?
6. Which Live-Stream-Video Format is supported in HbbTV 1.0?
7. Can an HbbTV App play multiple videos in parallel?
8. Which HbbTV Version supports DVB-DASH?
9. What is HDR? What is HFR? What is NGA?
10. Which technology is required for App2App communication in HbbTV CS?

Metaverse

1. Explain Metaverse in simple terms.
2. Explain the types of extended reality (VR, AR, MR)
3. What is the purpose of a graphics engine?
4. List all 3D model file formats not supported by Unity.
5. Explain the three steps of computation related to interactive 3D experiences.
6. What is remote rendering and how is it different from local rendering?
7. What are the consequences of delay in VR experiences?
8. Name four metrics types relevant for the Metaverse.
9. Explain Motion-to-Photon Latency.
10. Explain Click-to-Photon Latency.
11. What causes Motion-to-Photon Latency?
12. How can Motion-to-Photon Latency be measured?
13. What can photorealistic 3D assets contribute to?
14. What is NeRF?

Foundations of Media Streaming/ Advanced Media Streaming

1. Explain:
    a. OTT
    b. IPTV
    c. WebTV
    d. HybridTV
    e. CDN
    f. EME
    g. MSE
    h. DASH
    i. SAND
    j. HLS
    k. ISOBMFF
    l. CMAF
    m. 'pssh'
    n. MPEG2-TS
    o. MPD
    p. M3U8
    q. DRM
    r. CDM
    s. CENC
    t. CPIX
    u. PSNR
    v. VMAF
2. How does Adaptive HTTP Streaming work? What are the advantages/disadvantages?
3. Explain the principle of adaptive streaming. What technical challenges does it address?
4. What is the MPEG DASH specification covering and what not?
5. Which W3C HTML5 APIs enable adaptive and encrypted streaming in the Web Browser?
6. Which technologies have been replaced by HTML5 <video>? What are the advantages?
7. Explain the „Streaming Media Stack" and assign respective standards and technologies.
8. What are the principle differences between traditional TV delivery (broadcast), IPTV, WebTV with focus on technical challenges?
9. Explain Type1/2/3 playback in Web Browsers
10. Explain typical bandwidth requirements of SD, HD, UHD video formats.
11. Explain the entities of a CDN. Why are CDNs needed?
12. Explain the workflow create a multi-DRM protected stream?
13. How can streams be played back on iOS, Android etc.?
14. What is watermarking, two step watermarking?
15. How does server-side ad insertion work? How hoes app-based ad insertion work?
16. What is SAND metric reporting? What is SAND SRA?
17. What cases latency (in OTT live streaming)?
18. Name relevant DRM systems
19. Name relevant video codecs.
20. What is per-title encoding and what benefits does it offer compared to classic encoding solutions?
21. What are the main steps for per-title encoding?

Media Player - dash.js, ExoPlayer

1. What does ABR streaming stand for?
2. What is the main idea behind ABR streaming?
3. What are the types of browser-based media playback?
4. Which are the two APIs required for media streaming in the browser?
5. What is the purpose of the MSE?
6. What is the purpose of the EME?
7. What is dash.js?
8. What are the three main types of ABR algorithms?
9. What is the main purpose of content steering?
10. Name three use cases for low latency streaming
11. Which HTTP transfer mode is required for low latency streaming in the browser?
12. What does CMCD stand for?
13. What is the main purpose of CMCD?

14. Which are the common native media player frameworks on Android and Apple platforms?
15. What is the difference between unit testing and functional testing?

Media Delivery in 5G Networks

1. What are the main components of a mobile telecommunication system?
2. What is a carrier frequency?
3. What is the main idea behind Network Function Virtualization (NFV)?
4. What is the main idea behind Software-defined Networking (SDN)?
5. What is network slicing? What are use cases for different network slices?
6. What is MEC?
7. What is mmWave?
8. Which entity defines the specifications for mobile communication systems?
9. Name three drivers for 5G?
10. Which technology can be used to bring computation and data storage closer to the originating source?
11. Cloud Gaming is an example of?
12. Name the main components involved in the 5G Media Streaming process.
13. What is the difference between Unicast, Multicast and Broadcast?
14. What is FLUTE used for?

Dynamic Advertisement

1. What is Addressable TV and targeted Ads?
2. What is DAI? What is DAS?
3. What is Server-Side Ad-Insertion? What is Client-Side Ad-Insertion?
4. What are FAST channels?
5. What is stitching in the context of DAI?
6. What is Manifest manipulation?
7. What is Ad conditioning?
8. What is VAST?
9. What is SCTE?
10. What is the difference between SCTE-35 and SCTE-104?
11. What is Audio/Video Alignment?
12. Which SCTE-35 Commands are used for DAI and how do they differ?
13. What is HbbTV-TA?
14. What is the main function of the HbbTV-TA “fast media switch API”?

Context-Aware Media Streaming & Encoding

1. What is a video?
2. Why is the framerate of a video important?
3. Define the terms “resolution” and “aspect ratio”. What are the different types of aspect ratios?
4. What is the difference between progressive and interlaced encoding?
5. What is chroma subsampling and why does it typically require less bits than the classic RGB color model?
6. What is a video codec? Why do we need codecs for video streaming?
7. Describe the general working principle of video codecs.
8. What is the difference between intra prediction and inter prediction?
9. Name and describe the three different frame types.
10. What is a Group of Picture (GoP)
11. What are VMAF and PSNR used for?
12. What is Per-Title Encoding (PTE)?
13. How can artificial intelligence support/enhance the conventional approach of Per-Title Encoding?
14. What is Per-Shot Video Encoding?

Interoperable Web-supported Learning Technologies

1. Interoperability standards and open specifications for education?
2. Service-oriented infrastructures for learning?
3. Application areas of AI in learning
    a. prediction of knowledge levels and learning needs
    b. recommender systems
    c. personalized learning pathways
    d. chatbots/LLMs
    e. learning analytics

4. How do recommender systems work in education?
5. What is weak or strong AI and what is superintelligence?
6. What is
    a. artificial intelligence
    b. machine learning
    c. supervised learning
    d. unsupervised learning
    e. reinforcement learning
    f. classification
    g. regression
7. Which technologies and tools are typically used to solve machine learning tasks?

Securing Content-Provenance and Authenticity

1. What is a Deepfake?
2. What types of fake news exist?
3. What is a pirate copy?
4. What is C2PA?
5. Why do we need C2PA?
6. What is Blockchain?
7. What is IPFS?
8. What is a decentralized system?
9. Describe the difference between Proof-of-Work and Proof-of-Stake
10. Describe the difference between permissionless and permissioned blockchain
11. Describe the difference between public and private blockchain
12. What is Non-Fungible Token (NFT)?
13. What is the difference between Fungible Token (FT) and NFT?
14. What is Interplanetary File System (IPFS)?
15. How does IPFS work?