Discipline(s) : Infomatique et télécommunications

SCALABLE NETWORKS INFRASTUCTURES FOR OPTIMIZED SERVICES DELIVERY

Semestre	Semestre 2
Nature	UE

RESPONSABLES

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OBJECTIFS

Distribution of services, and particularly digital video, is undergoing dramatic transformation at present. Many developments in this area are changing the way contents are generated, distributed and consumed. These evolutions clearly stimulated the development of new technologies to tackled the main intrinsic flaws of the Internet, which allows opening new business opportunities with the rise of major Internet actors (in particular Content Delivery Network - CDN - providers).
This course studies the exiting technologies for an optimized services' delivery as well as the related challenges formulated in the following questions: How is services delivery currently performed in modern networks? How to improve the services' delivery (at both applications and networking levels)? What is the impact of such developments in the services' delivery ecosystem? How can we deal with real-time services? How can we optimize the resources utilization and the end-user quality? How to improve the scalabity of the services' delivery infrastructure? The research community has devised different approaches to answer the aforementioned questions. In this course, we review the major approaches and analyze their strengths and weaknesses.

KEYWORDS

Content Delivery, Interactive Multimedia, Real-time, Software defined networking, Scalable infrastructures

PREREQUISITES

Very basic knowledge of video compression, knowledge in TCP/IP networking.

CONTENTS

1. Overview of traditional services' delivery architectures
        IPTV and VoD architectures
        Challenges for the streaming over the Internet
2. QoE and Dynamic Adaptive Streaming over HTTP (DASH)
        Overview of adaptive streaming strategies
        Efficient QoE calculation for DASH

Improving the QoE while optimally utilizing the available net- work infrastructures
3. Revolution of services' delivery with caching and Content Delivery Networks (CDN)
    Architectural overview of CDNs' architectures
    Use cases (Netflix, Google, Akamai, . . .)
    Relevance of caching and best caching strategies
    Impact of caching in the ecosystem and related challenges
4. Research trends in media delivery
    CDN as a Service
    Information Centric Networking (ICN)
    P2P performance and downloading strategies
5. Interactive Online Multimedia Systems
    Applications: Cloud gaming, 360 Video streaming
    Location of the main software components (servers, virtual ma- chines)
    latency vs. response time: analyzing the trade-off between what users want and what service providers can offer
    Ultra low-latency video streaming and new Internet protocols (MPTCP, HTTP/2, WebRTC)
    Optimization of video encoding and transcoding to adjust to bandwidth and latency
6. Research trends in networking
    Evolution towards Software Defined Networking (SDN)
    Network Virtualization and its relation with SDN
    Network Function Virtualization (NFV)
    Use cases (Media delivery, . . .)
    Challenge and remaining issue

LEARNING OUTCOMES

Impact sociétal: Comprendre les challenges derrière la distribution de contenus, Ecosystème diverse (Opérateurs de réseaux, opérateur de CDN, fournisseurs de contenus, fournisseurs de services, …) et très dynamique

APPARTIENT À

Master 2 informatique parcours Science Informatique

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