Multi-device browsing with the Information Division/Cooperation technology

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Introduction

For the multi-screen and the multi-device services, NTT has researched and developed the technologies [1-4]. The Information Division/Cooperation technology is the one that enables traditional HTML5 content to be divided into the DOM elements and to be distributed to each browser on multiple devices. Our technology controls exchanging messages between the elements on different devices, so that each device plays the divided content collaboratively together, and in other words, the single content can be played on the multi-device browser environment. The technology is not specified on the current TV or IPTV services so far but we believe it can be useful if such services are provided on the HTML5 browser in the future. Thus, we would like to share the idea, expecting it to contribute to a discussion on the multi-screen services.

Our Concept

Recently, the multi-screen services or the multi-device services that use multiple devices together are expected users to consume contents interestingly or conveniently, i.e. playing games on TV with tablets as controllers, viewing video-on-demand programs on TV with smart-phone control, or playing a video on smart-phone with enjoying the sound and music on a networked high-quality audio system.

To realize such new applications that can cross devices, there are some hurdles from the application developer's view.

    a)   How shall we connect many kinds of devices made by different manufacturers?

    b)   How should we create complicated content to suit multi-device usage?

    c)   How can we control the content over multi-devices easily?

Nowadays, HTML5 might be a helper for solving the point a) and b). HTML5 browsers are deployed on not only PC but also consumer electronics devices such as TVs, smart-phones and tablets. If they are on various devices for the multi-device services, they can be used even if they are on different manufacture devices. Moreover, HTML5 supports rich contents such as TV-like video streaming and games and it is structured, so that content can be described in parts for each devices.

However, c) is another problem. With a view point of reducing content creation cost, it is easier to create traditional single HTML5 application in one browser than HTML5 application for every device for web application developers. When the content is divided into parts and distributed to devices, it could be controlled by one site. If this controlling technology is realized, the application for multiple devices can be created easily with low cost.

Overview of our technology

Our Information Division/Cooperation technology controls the content distribution to multiple devices. Figure 1 shows the overview of how the technology works.
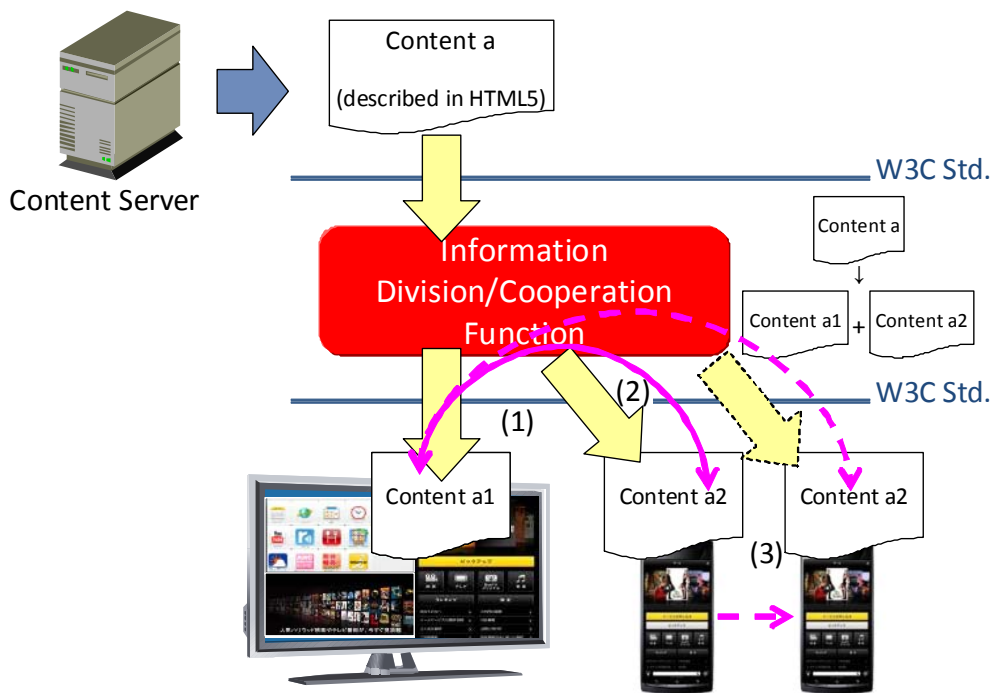

Figure 1: Overview of the Information Division/Cooperation technology

The Information Division/Cooperation function is placed between the content server and client devices.

(1)   Distribute content elements in units of DOM to each device

The Information Division/Cooperation function first gets the content (HTML5, JavaScript, CSS) from a web server and analyzes it. After it constructs a DOM tree, it splits the HTML5 content of the web page into sub-content suited for each device and allocates them to each device. And, each browser on each device gets that part of the DOM tree assigned to it and renders it. Thus, the function manages the HTML5

contents delivered from the web server and it also manages all devices that are accessing the web application.

(2)　Exchange messages between the elements on different devices

The Information Division/Cooperation function supplies DOM APIs to support the content's JavaScript. If a DOM API is called, the Information Division/Cooperation function traverses the DOM tree and reflects any resulting modification to the appropriate devices. If an event is fired at a client device's browser, the event is passed to the Information Division/Cooperation function. If the event listener is registered by a DOM API, the intermediate browser performs the appropriate action.

(3)　(Option) Move or copy the elements to the other device

Since the Information Division/Cooperation function manages the connecting devices and the delivered elements to them, it can copy or move the same element to a browser on the other client devices with a user's demand.

In these manners, our Information Division/Cooperation technology enables traditional HTML5 content to be played on the best environment with suitable multiple devices here and now. HTML5 developers can create multi-screen applications easily and HTML5 browsers can be used without any additional program development.

References

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