

From: Adam Trevor
Sent: Wednesday, September 26, 2001 1:05 PM
To: Brian Crites; Jess Peterson; Preston Byargeon
Cc: Richard Saunders; Anders Klemets
Subject: RE: Summary: Corona and Time Compression

As long as we stick to HTTP and RTSPT using progressive streaming there is no additional cost to what we are already doing. I put this as one day extra per test pass just so we cover this content as necessary.

If, in addition, we plan to implement this in UDP and progressive download then costs get higher upto six person days per test pass.

I hope this answers your question.

-----Original Message-----

From: Brian Crites
Sent: Tuesday, September 25, 2001 7:03 PM
To: Jess Peterson; Preston Byargeon
Cc: Adam Trevor; Richard Saunders; Anders Klemets
Subject: RE: Summary: Corona and Time Compression

Thanks for the info Jess. One of the options was to have the TC DMO inside the SDK; however, as I thought about this today, it may be possible to still have the DMO outside the SDK and just use progressive streaming from the Player to get the data faster than realtime. We will discuss this option tomorrow.

For now, I think these rough estimates are satisfactory.

Adam, are there any additional progressive streaming to consider for explicit testing? Please see this embedded mail to see if it would suggest that anything additional needs coverage.

<< Message: RE: Time compression and WMF SDK (Corona) >>
- BrianCr

-----Original Message-----

From: Jess Peterson
Sent: Tuesday, September 25, 2001 4:42 PM
To: Brian Crites; Preston Byargeon
Cc: Adam Trevor; Richard Saunders
Subject: RE: Summary: Corona and Time Compression

I'm estimating 1 day, maybe 2 to add tests to playback around 15 different pieces of content at rates in which TC would be active. Since this will be automated, the time added to our test pass is basically the time it takes to playback the content ~2 hours added to the functional test pass. Minimal extra time will be needed to add tests through the sync reader.

My concern is verification. If we are responsible for testing that the audio sounds fine at several different rates and across all wma formats, this will take at least 1 extra day per functional test pass to verify that the TC code is producing valid audio.

One last question. Will the TC DMO adjust for rate changes that occur on the fly?

-----Original Message-----

From: Brian Crites
Sent: Tuesday, September 25, 2001 3:13 PM
To: Jess Peterson; Preston Byargeon
Cc: Adam Trevor; Richard Saunders
Subject: RE: Summary: Corona and Time Compression

below

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EXHIBIT 10
Althea L. Miller
CSR No. 3353
Date: 4/30/03
Witness:
B. Miller

Plaintiff's Exhibit

7006

Comes V. Microsoft

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-----Original Message-----
From: Jess Peterson
Sent: Tuesday, September 25, 2001 1:59 PM
To: Brian Crites; Preston Byargeon
Cc: Adam Trevor
Subject: RE: Summary: Corona and Time Compression

Can I get these questions answered before I give any estimates?

- I know the APIs needed for this are unknown, but will it be something like this?
 - Call SetOutputSettings with some global string specifying "use time compression"
 - Call IVMReader::Start giving it a rate >1 and <= 2

[briancr] Sounds about right.

- It sounds like this should only be exposed through the async reader and not the sync reader. Is this correct?

[briancr] Not determined but we could make that recommendation if it would increase the test matrix substantially. Swag with and without in sync reader.

- If using the user driven clock and asking for time compressed samples, what happens?

[briancr] Dunno. But it would seem that if the DMO has support for a user clock, this should be trivial and fully understood. If it has its own clock, it can't be supported.

- How much do we have to worry about performance?

[briancr] Lots. This has to work on the Player but I am not sure what this has to do with this other than a basic measurement.

It is stated below that this will work with audio, video, script, and web streams.

- If it works with web streams, does that mean it works with any file transfer stream?

[briancr] My read on this is that only audio will have the DMO in the pipeline. The others will merely be delivered at the rate of the TC for faster rendering or what have you.

- What about image streams or generic arbitrary data streams?

[briancr] See my last comment.

-----Original Message-----
From: Preston Byargeon
Sent: Tuesday, September 25, 2001 10:13 AM
To: Brian Crites
Cc: Adam Trevor; Jess Peterson
Subject: RE: Summary: Corona and Time Compression

I can get test estimates for networking and SDK. Is someone getting estimates from the player team as well?

-Preston

-----Original Message-----
From: Brian Crites

2

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Sent: Tuesday, September 25, 2001 9:59 AM
To: Preston Byrgeon
Subject: FW: Summary: Corona and Time Compression

FYI

-----Original Message-----

From: Troy Batterberry
Sent: Monday, September 24, 2001 12:43 AM
To: Richard Saunders; Anoop Gupta (UltimateTV); Anders Klemets; Sohail Mohammed; Dawson Dean; Ming-Chieh Lee; Li-wei He; Patrick Nelson (US)
Cc: Kathy Demaree; Kip Olson; Brian Crites; Carolina Jurgensen; Jordi Ribas; Geoff Harris; Anoop Gupta (RESEARCH); Nick Vickers-Harris; Cory West
Subject: RE: Summary: Corona and Time Compression

Rich - my apologies for missing the meeting. See comments below.

-----Original Message-----

From: Richard Saunders
Sent: Wednesday, September 19, 2001 11:01 AM
To: Richard Saunders; Anoop Gupta; Anders Klemets; Sohail Mohammed; Dawson Dean; Troy Batterberry; Ming-Chieh Lee; Li-wei He; Patrick Nelson (US)
Cc: Kathy Demaree (WALLING); Kip Olson; Brian Crites; Carolina Jurgensen; Jordi Ribas; Geoff Harris; Anoop Gupta (RESEARCH); Nick Vickers-Harris; Cory West
Subject: Summary: Corona and Time Compression

A brief summary of the meeting yesterday. Next immediate steps are 1) to discuss with the WMF SDK team about potential support we may need, and 2) cost the dev work to see if it will fit into our CC schedule.

Short term vs long term technical strategy

First, there was a brief discussion about implementations for time compression. Ming has recently spent some time thinking about how optimizations could be achieved if TC was incorporated into the codecs/rendering somehow. This work is longer term however and would not occur until Longhorn time frame. The concern was that the short term (Corona) and longer term implementations would not be compatible or complimentary. We concluded however that implementing something in Corona as we currently understand it would not preclude optimizing the implementation via the codecs/rendering for Longhorn.

Short term implementation (Corona)

We are still evaluating whether we can do TC for Corona but this was a good meeting to clarify requirements and implementation details.

To clarify, what we mean when we talk about Time Compression as a feature in Corona:

- ✓ Linear time compression only - no pause removal. Max acceleration speed is 2.0. We will not support deceleration (rate < 1.0).
- ✓ Player support only (no time compression exposed directly from WMF SDK)
- ✓ Windows Media format content only
- ✓ Works from a Hercules server or a local file

3

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- ✓ Works with audio, video, script commands, web streams (streaming html) content
- ✓ LAN based, corporate scenario for Corona. We may do some small optimization for modern but this version of the TC feature is targeted at LANs with ample bandwidth.
- ✓ No SAMI support. It would require additional work to support SAMI. Richsa to follow up to verify that we can make this call.

Player

The player will need to know how to detect when to enable TC - like with accelerated streaming, there will be cases where we cannot enable TC.

UI to enable TC acceleration (FF/RW type UI).
Show the appropriate time (presentation time).

Server/Network

We believe that most of the support for TC may already be in Hercules/Zues networking via burst mode (accelerated streaming). At best things will work without any changes. At worst there may be some mods to the packet pump on the server. We will have to test to determine. There will need to be support from the WMF SDK to request data at a specified rate from the network.

Note that accelerated streaming uses TCP.

From Dettberg: There are two new streaming metaphors in Hercules. First, there is "Rapid Start". This metaphor allows the client to receive the first portion of the content (generally the first 5-10 seconds) at a rate that is greater than real-time. Rapid Start is protocol agnostic and can be used for both live and on-demand scenarios.

The second delivery metaphor is Progressive Streaming. Progressive Streaming is currently limited to on-demand content. It allows the client to receive the entire file at a rate greater than real-time. Progressive streaming is linked to TCP. Progressive Streaming is probably the metaphor best suited for the TC work you are doing. If you find bugs in the server during the integration work, we simply need to fix them. Other customers are already using some of the functionality for a variety of applications.

Rendering Infrastructure

Essentially what is needed is the ability to accelerate the playback graph for TC. The TC DMO is applied to the audio stream only. Video and other streams are simply rendered at a faster rate and playback is handled by the system. LI-we's prototype built on v7 WMF SDK and Player (with mods) have verified that this works in basic cases. We will need to resample the audio at some point in the graph so that we are not exceeding the capabilities of the dshow audio render (ie. > 44.1KHz). Current thinking is that we would request the desired sample rate, after a calculation from the TC DMO, from the WMF SDK but this could also be done in the TC DMO. This is being investigated.

We may also investigate using a lower bandwidth stream (in the case of MBR video) on slower connects to enable TC but with lower quality video.

WMF SDK

From the WMF SDK we need the ability to get data (all a, v, etc) at a specified rate from a local file or the server. We need to

investigate if this requires new work from the WMF SDK or not. [Troy Badarberry] Anders is the right person to comment on whether any new methods are required on the SDK to extensively control the request. Internally, the request mechanism should already be functional. You should also be able to use the URL modifier (WMF/Rate) as an interim workaround. See the spec at <<[showtime]
docs\platform\Network\Progressive Streaming Specification.doc>> for details.

Research (Anoop and Li-we) want to make sure that we feel well supported by them in this effort if we choose to proceed. Li-we will supply the TC DMO code and work to integrate it. A similar arrangement was done with the v7.0 Encoder TC module and that experience went quite well.

Rich

3

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