



Player Optimization

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hulu



Hulu's mission is to help people find and enjoy the world's premium video content when, where and how they want it.

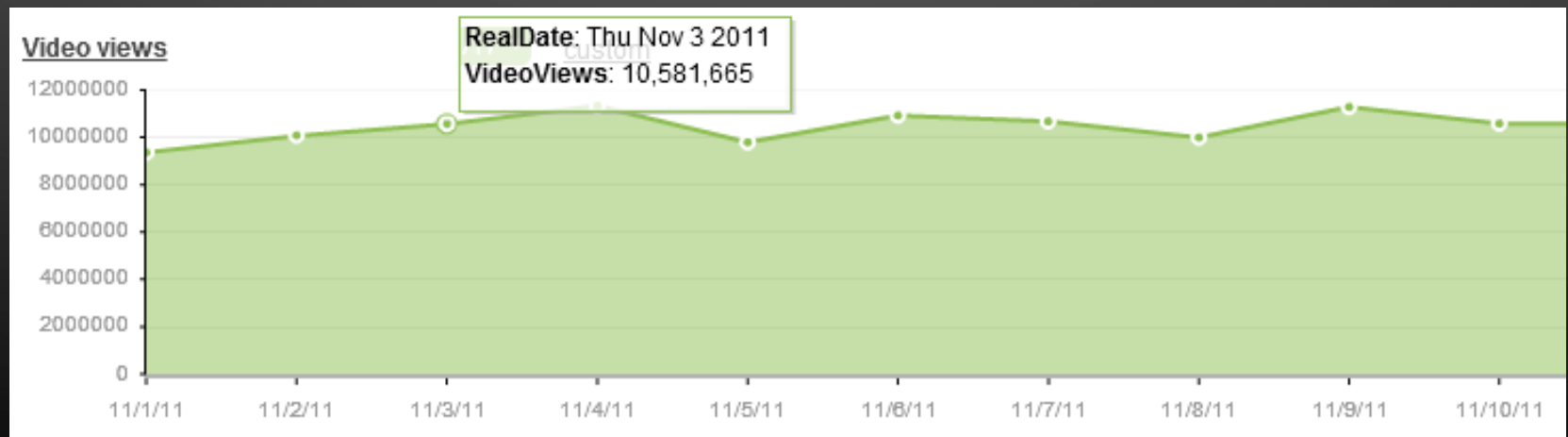
Dashboard

Mar 1, 2008 - Nov 1, 2011 ▾

Pageviews ▾

Graph by:   





Why is performance important?

- User experience
- Business value



Performance metrics

- Loading time
- CPU & Memory
- Bandwidth & Buffer

What affect performance?

Video transcoding

Player SWF size

Page loading

Client machine

Service loading

User bandwidth

Content bit rate

UI design

Code efficiency

Buffer logic

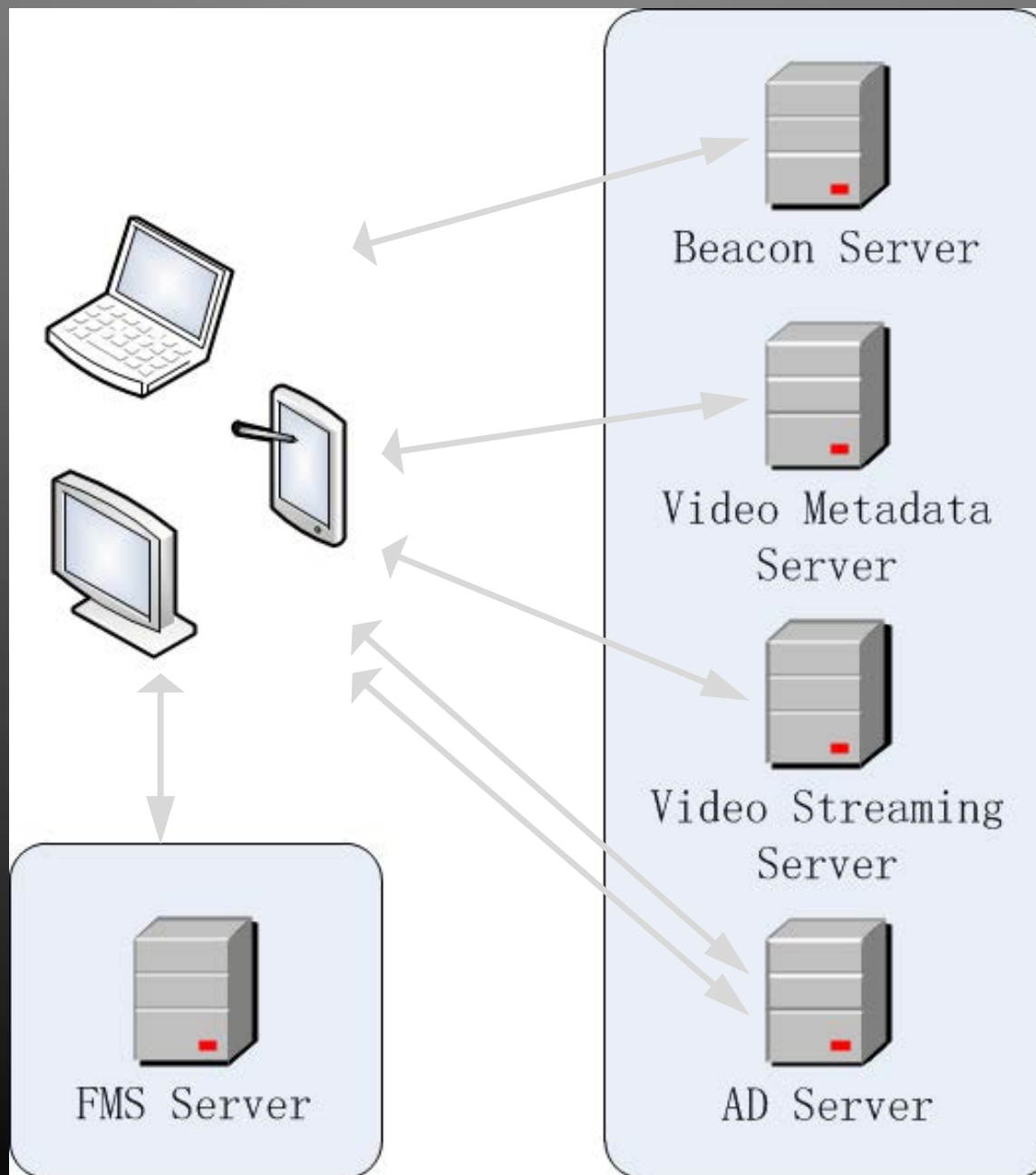
Flash version

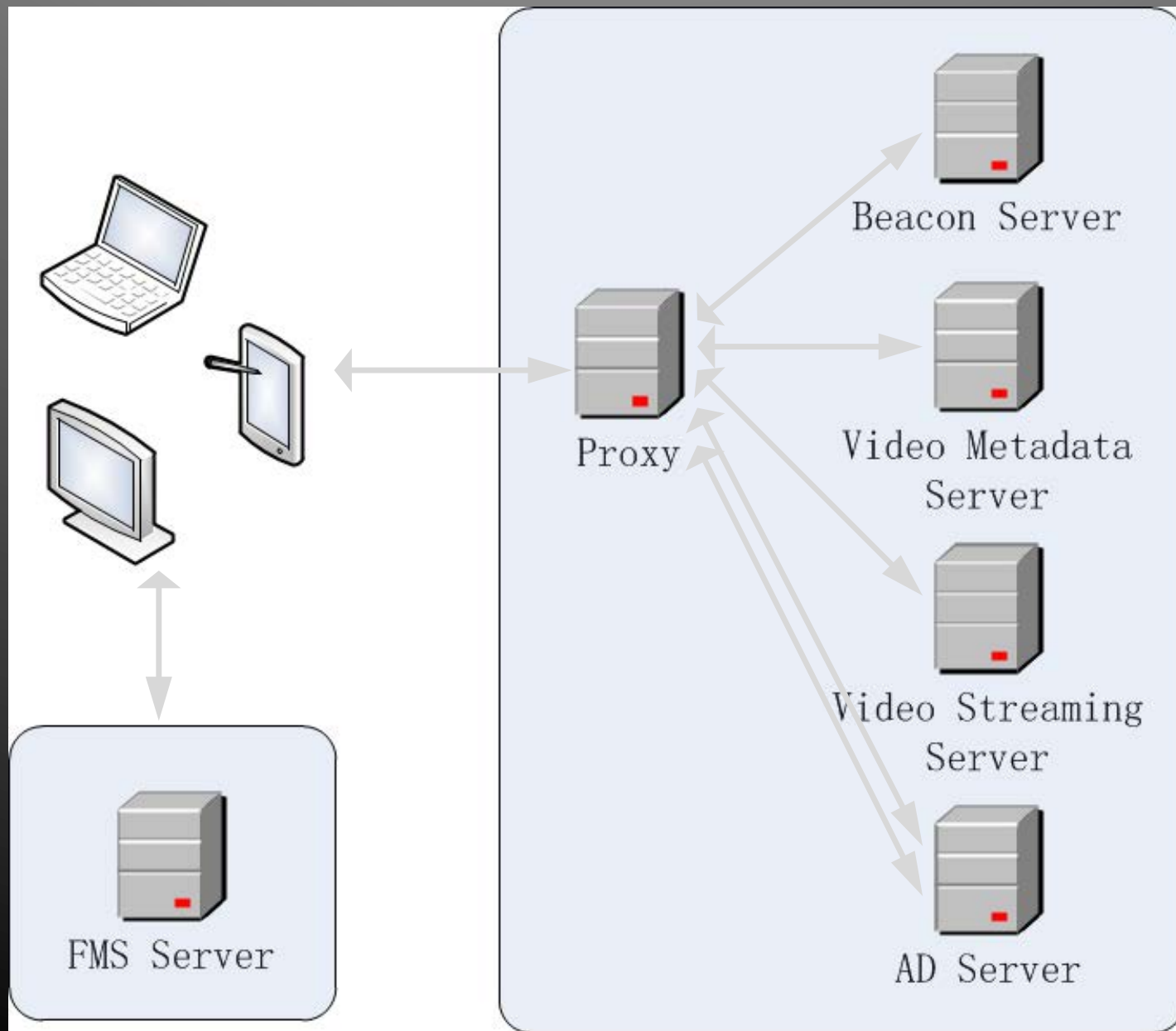
Performance improvement

- Optimize architecture
- Improve key technology
- Focus on detail
- Performance monitoring system
- Balance UI design and performance

Optimize architecture

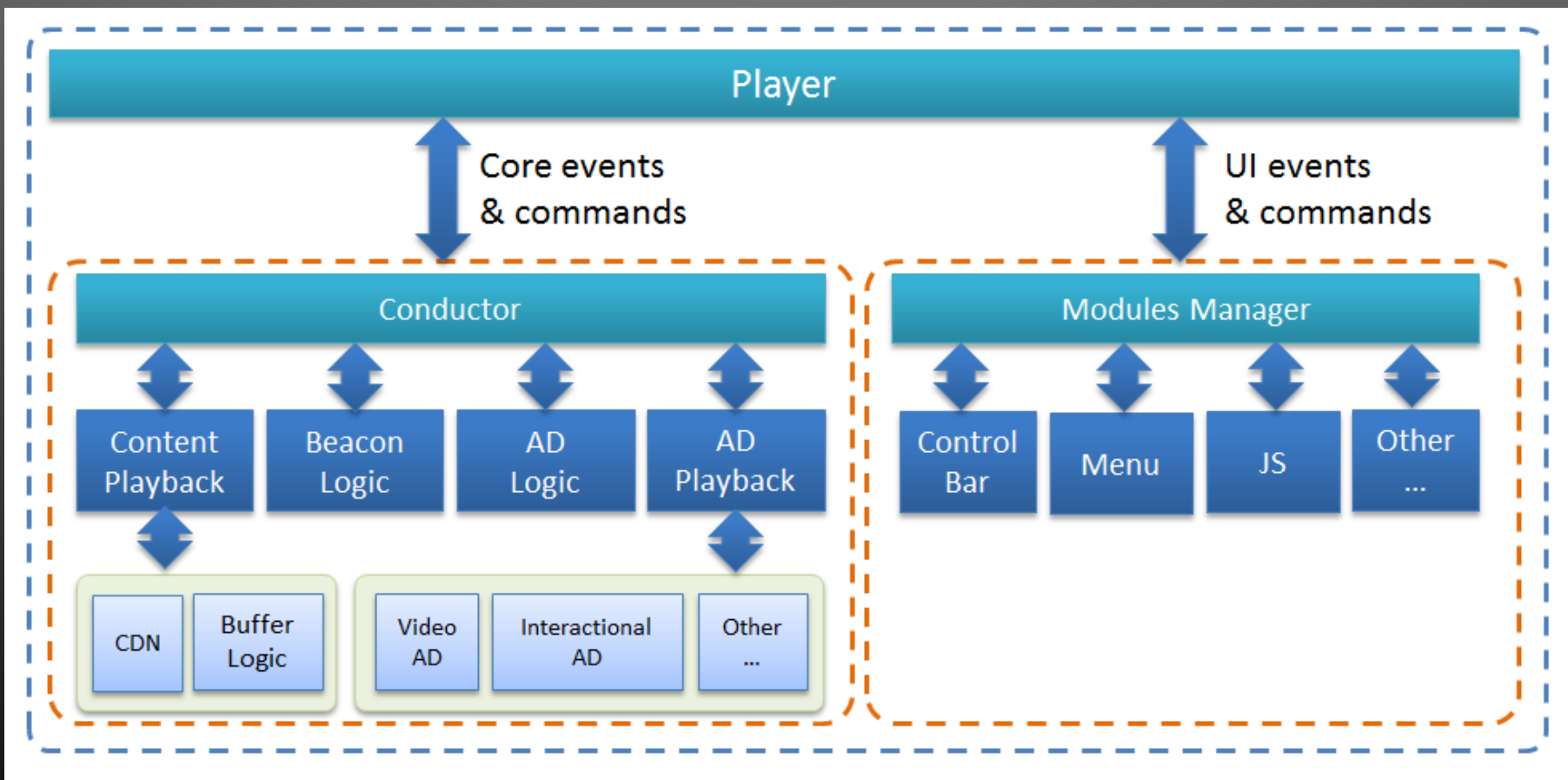
- Performance
- Quick development & deployment
- Balance between client and server





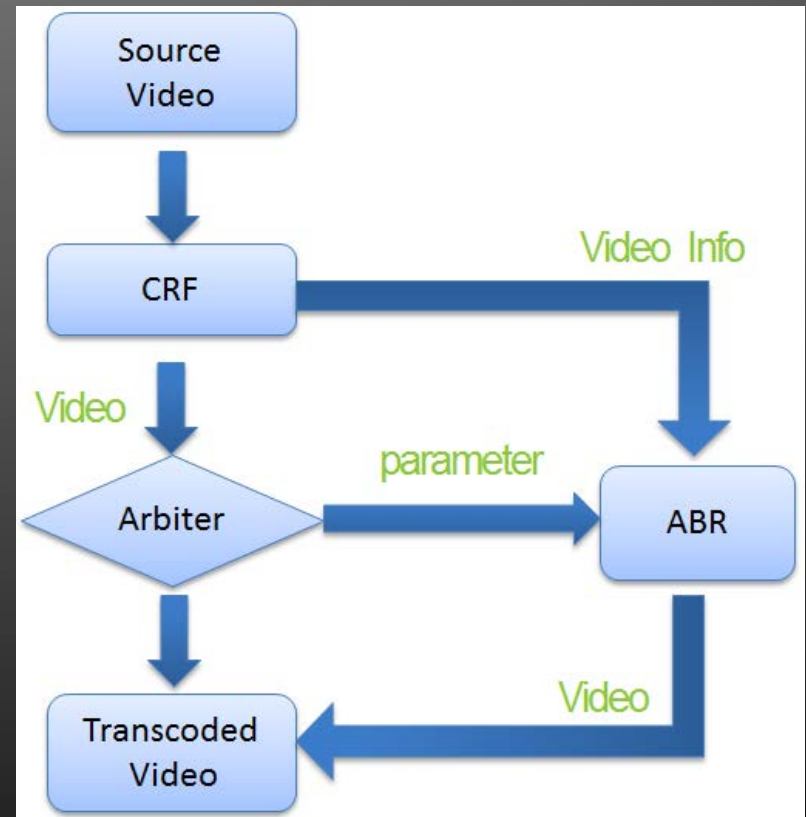
Optimize architecture

- Componentize player
 - Preload & Lazy load
 - Cache setting
 - Flexibility



Improve key technology

- Video transcoding
 - Balance quality and bitrate
 - Hybrid CRF+ABR
 - Tune transcoding profile



Improve key technology

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Improve key technology

- Multiple CDN enhancement
 - Stability
 - Better user experience



Rebuffered Session Ratio

DP: Hulu.com; Plan: All

[link to this chart](#)

 Download Chart

 Download Chart as Count



Improve key technology

- Adaptive multiple bit rate
 - Frame Drop
 - Buffer
 - Bandwidth
 - Screen size

Improve key technology

- Stage Video
 - Utilize GPU for video decoding and rendering
 - Decrease 2% frame drop

Focus on detail

Preload & lazy load

Buffer logic

Use FSO

Parallel loading

Limit IO operation

Heavy calculation

Share library

JS optimization

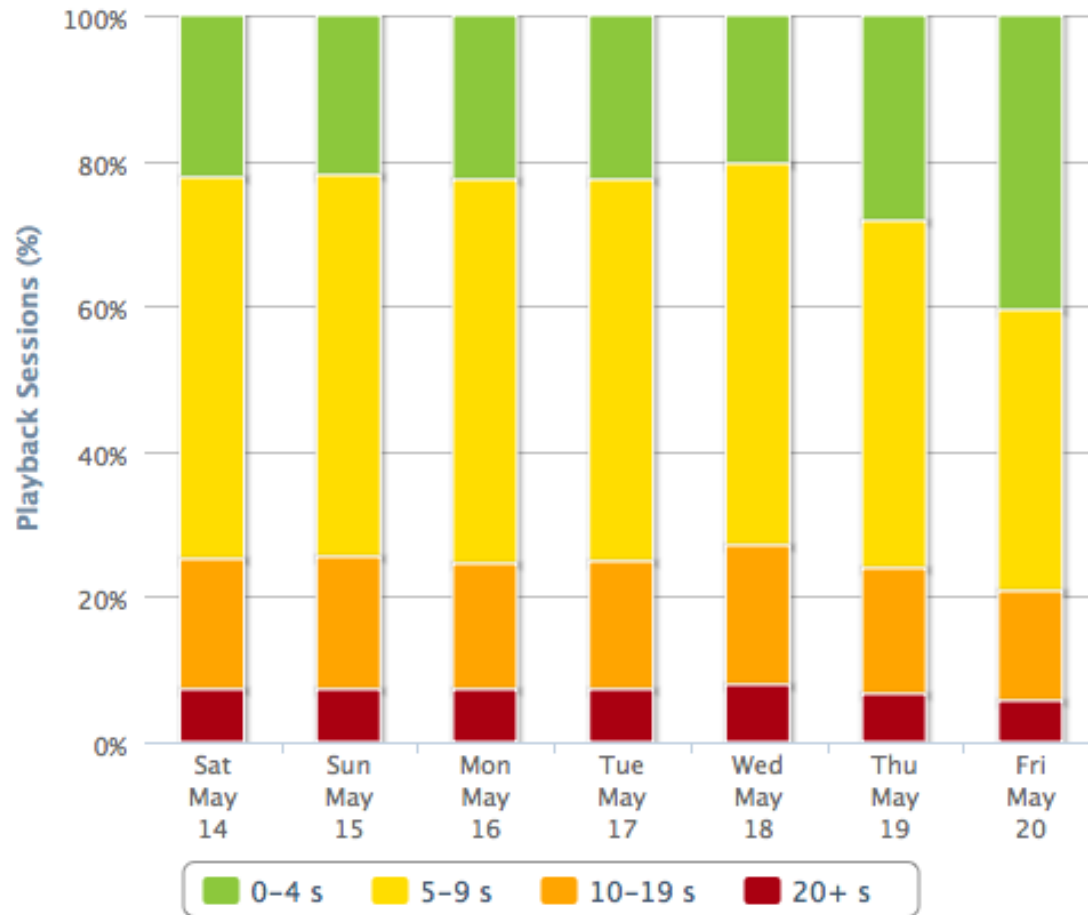
wmode

Embed wrapper

Focus on detail

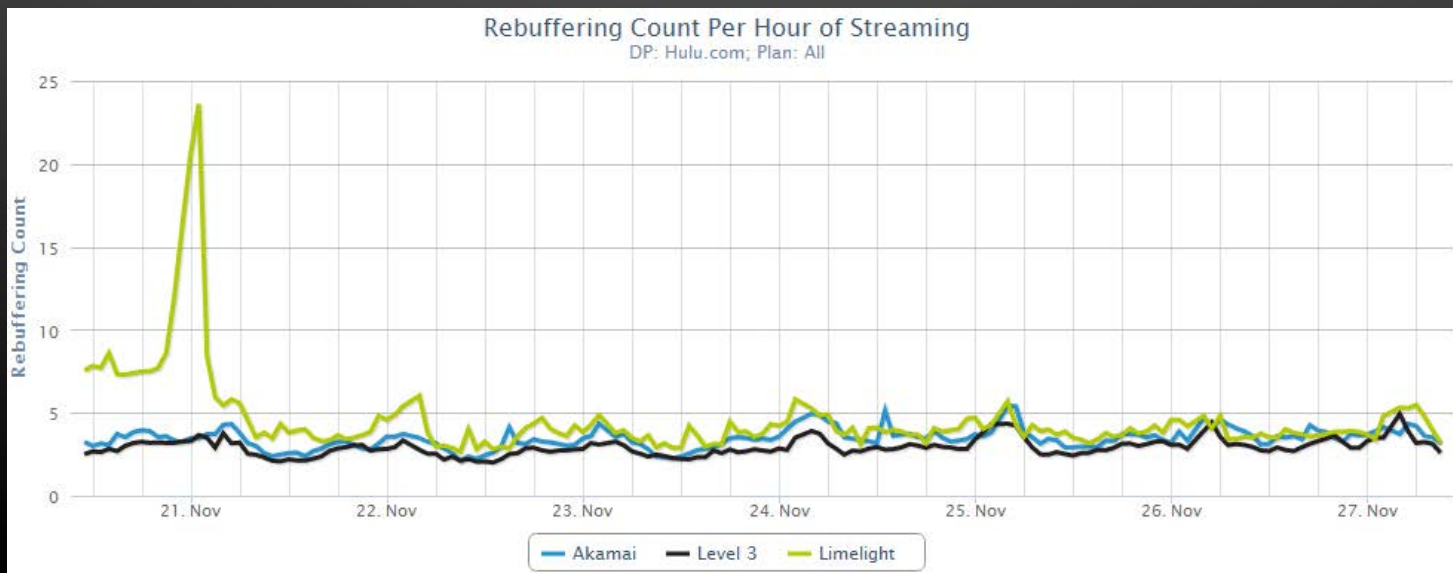
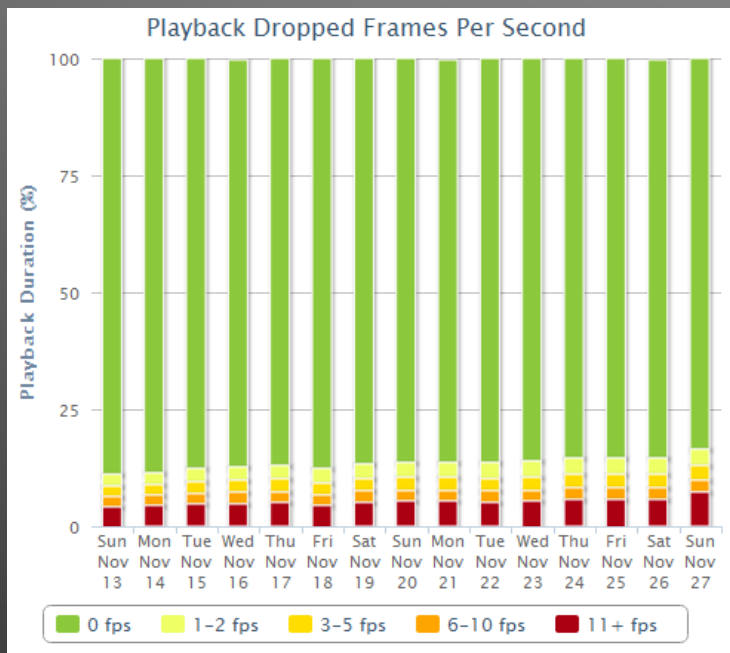
- Refine buffer logic between ad and content
- Simplify player embed code injection logic

Player Loading Time



Performance monitoring system

- Measures the quality of our video playback experience
- Goal is to have *insight* into what our users are seeing that is:
 - Early
 - Accurate
 - Actionable



Balance UI design and performance

- Evaluate performance when design
- Consider user subjective experience

Conclusions

- Metric definition is necessary
- Keep monitoring the system
- New technology is double-edged sword
- Focus on architecture and detail
- Good design is important

Thank You !

Any Questions ?

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