

Responsiveness, Energy Efficiency, and Data Usage

The Future of Mobile Web Applications

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- ▶ **RED**: Responsiveness, energy efficiency, data usage

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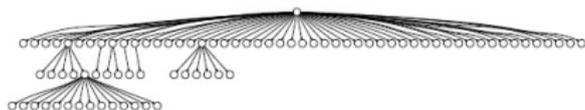


Figure: An ordinary dependency graph of an ordinary web page

Responsiveness

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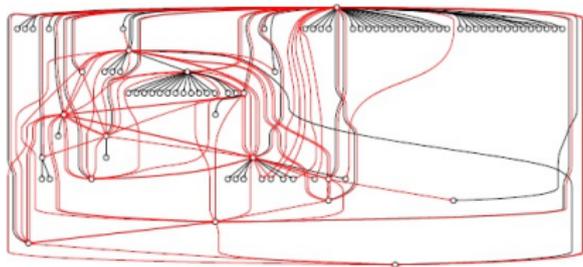
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- ▶ Rewrites HTML files and JavaScript codes in order to create more accurate dependency graphs

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- ▶ **Scout**: Measurement infrastructure, capable of automatically tracking fine-grained and less obvious data dependencies
- ▶ Rewrites HTML files and JavaScript codes in order to create more accurate dependency graphs
- ▶ When web browser tries to display according web page, it will succeed faster because of new dependency graph

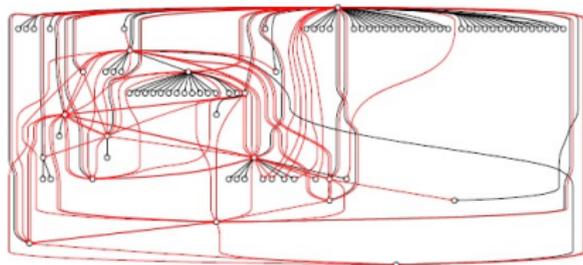
Responsiveness

Figure: The same dependency graph newly created by Scout



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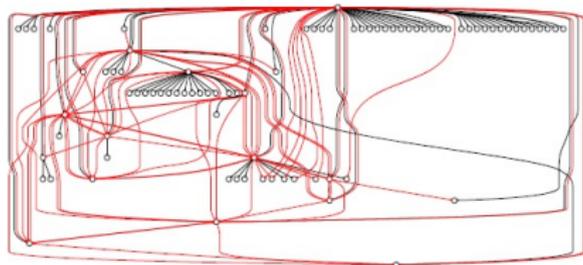
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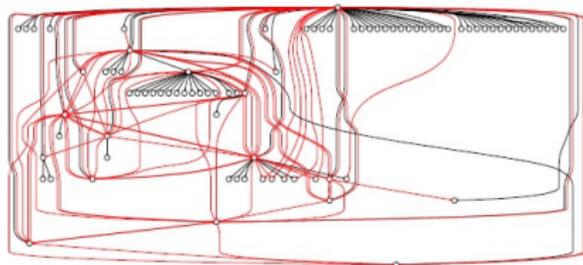
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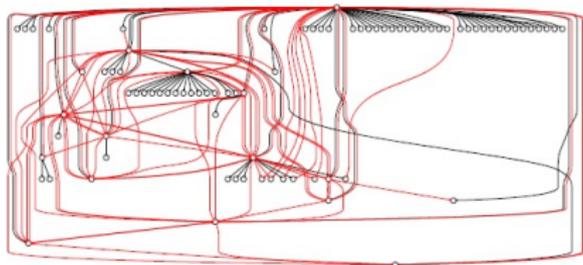
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- ▶ **Polaris**: Uses Scout's new dependency graphs and performs dynamic observations of network's condition in order to optimize web page loading time
- ▶ Capable of reducing web page loading time by 34% at the median

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- ▶ Energy efficiency and its concerns delegated onto hardware and operating system manufacturers
- ▶ Solutions contributing to energy efficiency on programming language level represent direction filled with potential

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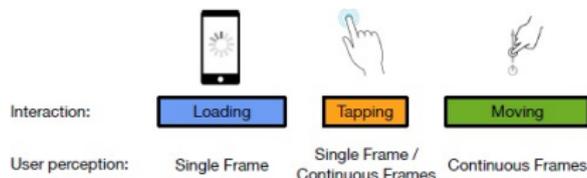


Figure: Depending on user's movement, energy consumption is managed differently

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- ▶ Images compressed to $\frac{1}{3}$ of original size (66%) on average, responsible for 85% of data size benefit
- ▶ Other data size reductions observable regarding CSS (52%), JavaScript (41%), HTML (38%), and plain text (20%), on average

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- ▶ Energy inefficiency one of main reasons for negative application reviews, 55% of application users claim to uninstall application which uses too much energy

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Thank you for your attention!

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