MICHIGAN STATE
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Project Plan

Optimizing Firefox Localization

The Capstone Experience

Team Mozilla

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From Students…
…to Professionals

Functional Specifications

- Competition among browsers
- Continued migration to Fluent
  - better user experience
- Better developer experience
  - tests mitigate errors from repetitive tasks
- Gauging performance gains

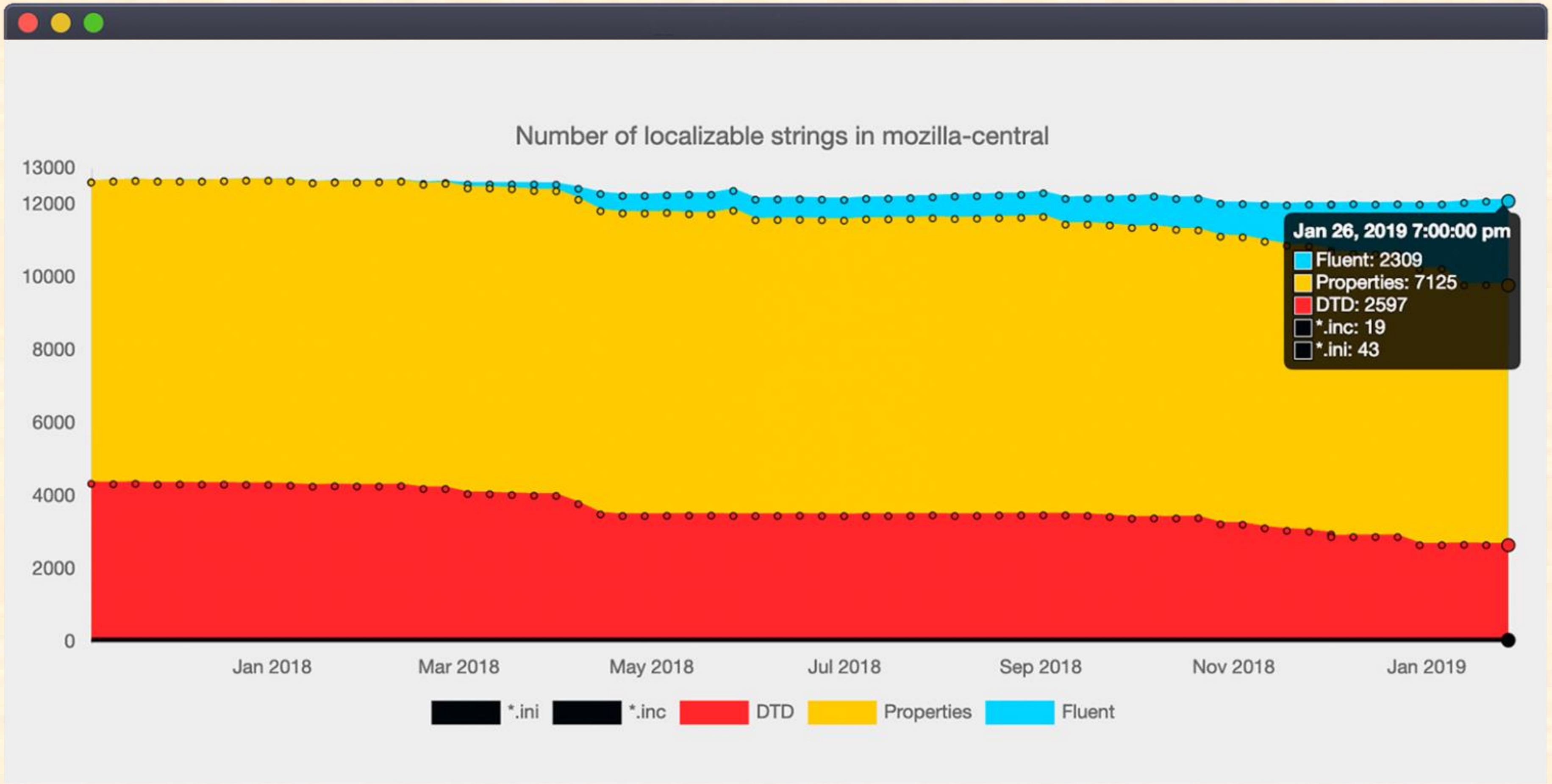
Design Specifications

- New translation paradigm
  - asymmetrical translations

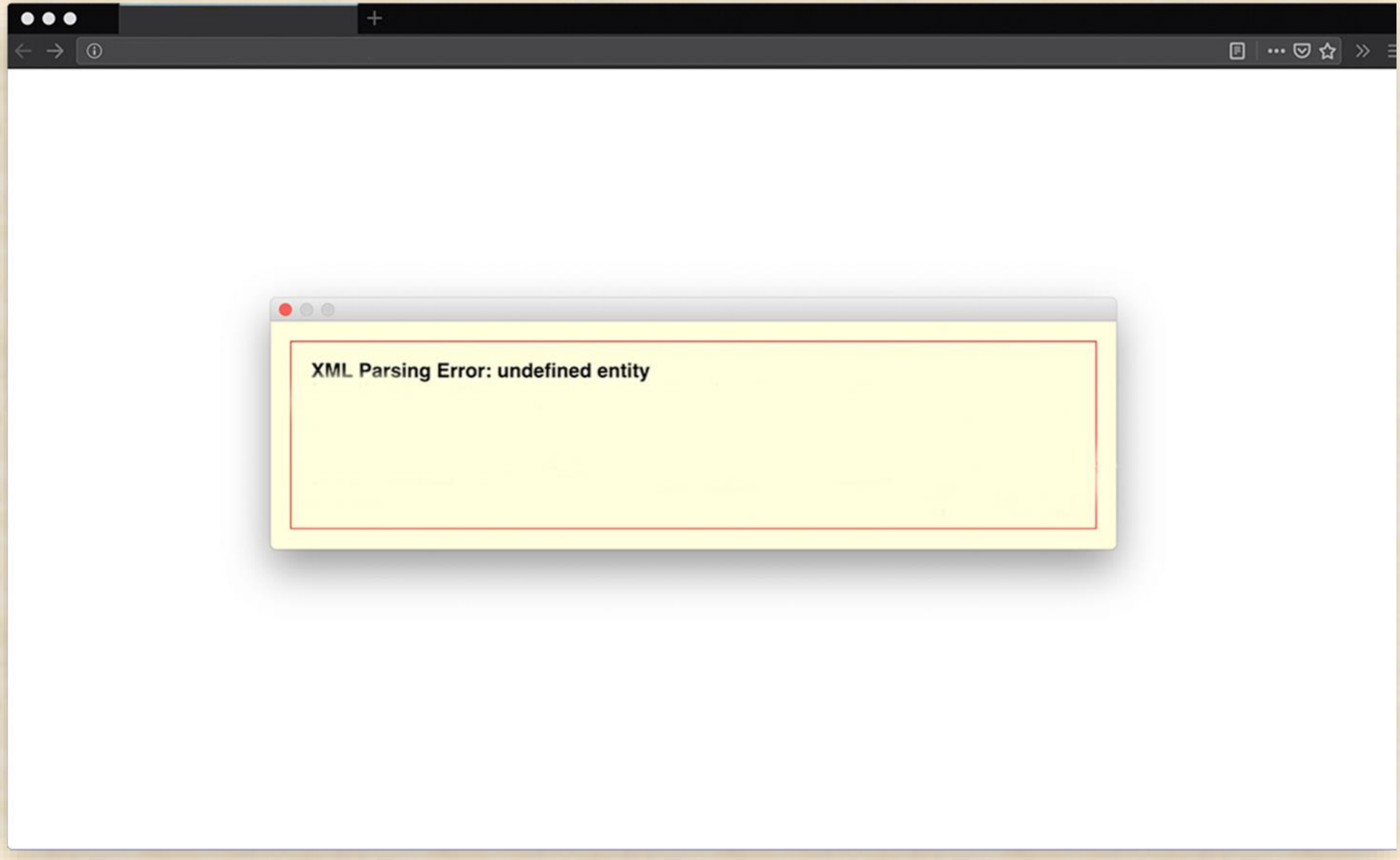
- Faster interface
  - faster loading with WebAssembly

- Extended tooling around Fluent

Screen Mockup: Fluent Migrations

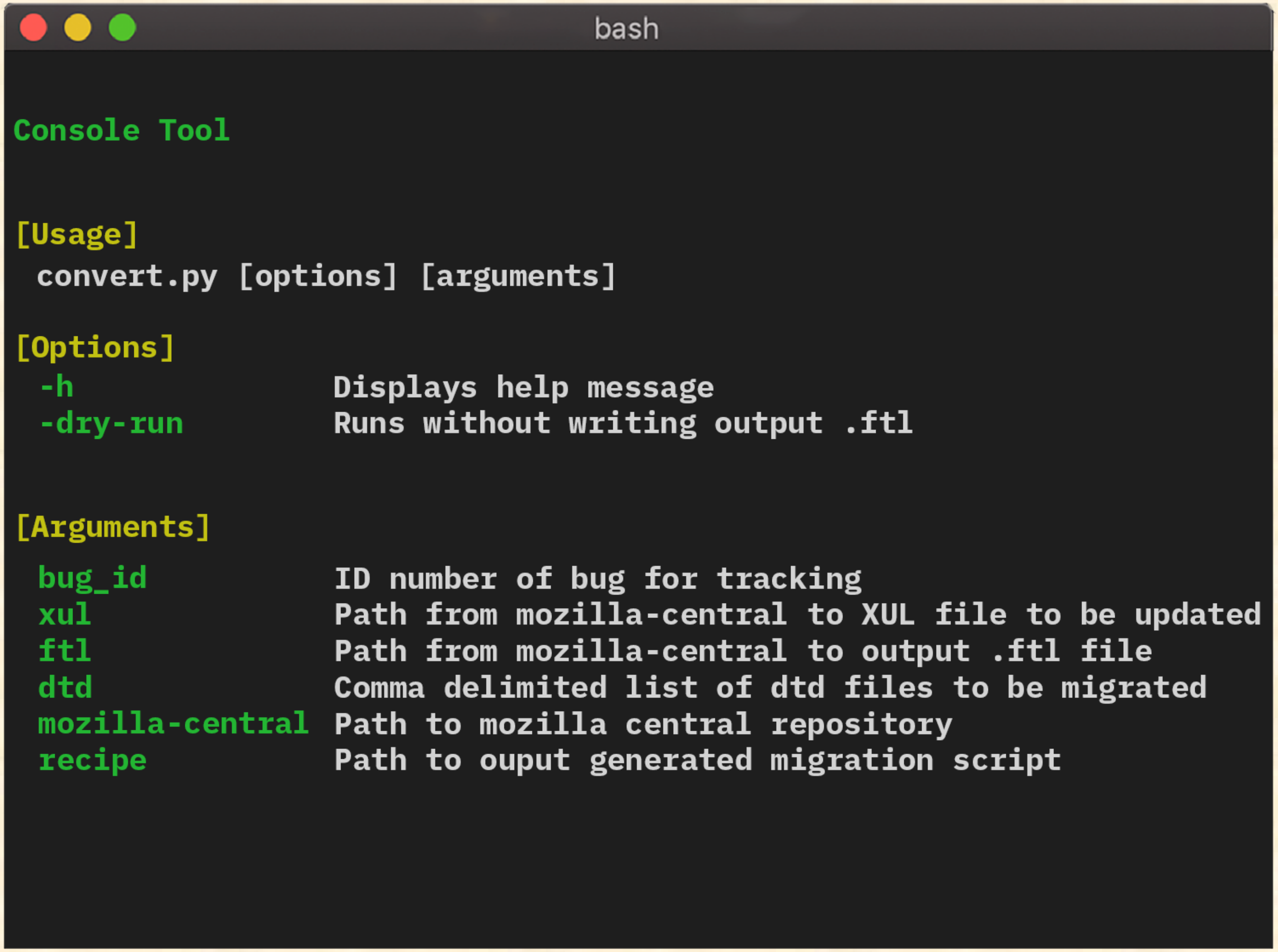


Screen Mockup: Yellow Screen of Death



XML Parsing Error: undefined entity

Screen Mockup: Console Tool - Conversion



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Console Tool

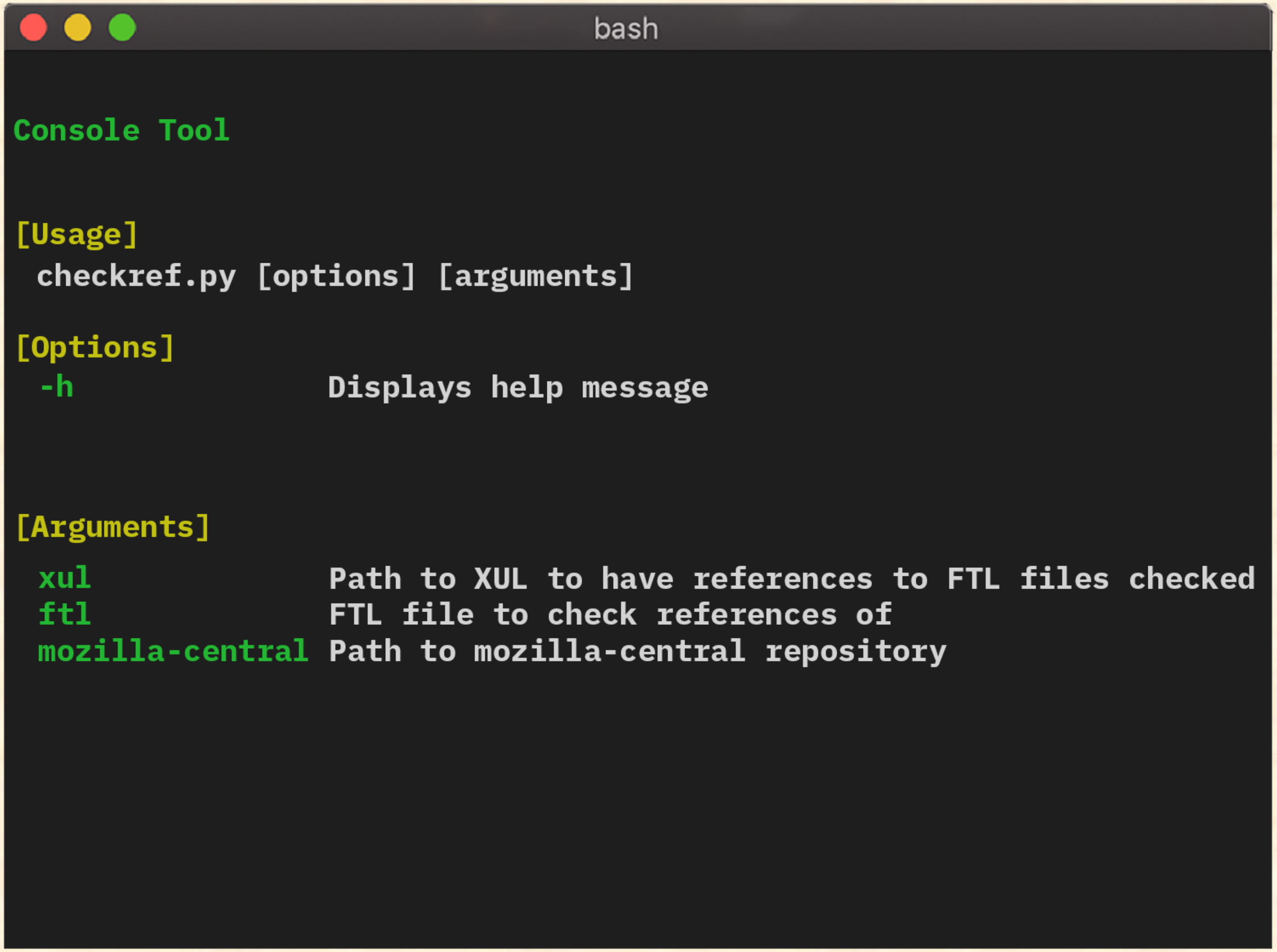

[Usage]
 convert.py [options] [arguments]

[Options]
 -h               Displays help message
 -dry-run         Runs without writing output .ftl


[Arguments]

 bug_id           ID number of bug for tracking
 xul              Path from mozilla-central to XUL file to be updated
 ftl              Path from mozilla-central to output .ftl file
 dtd              Comma delimited list of dtd files to be migrated
 mozilla-central  Path to mozilla central repository
 recipe           Path to ouput generated migration script
```

Screen Mockup: Console Tool - Reference Checking



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Console Tool

[Usage]
 checkref.py [options] [arguments]

[Options]
 -h              Displays help message



[Arguments]
 xul             Path to XUL to have references to FTL files checked
 ftl             FTL file to check references of
 mozilla-central Path to mozilla-central repository
```

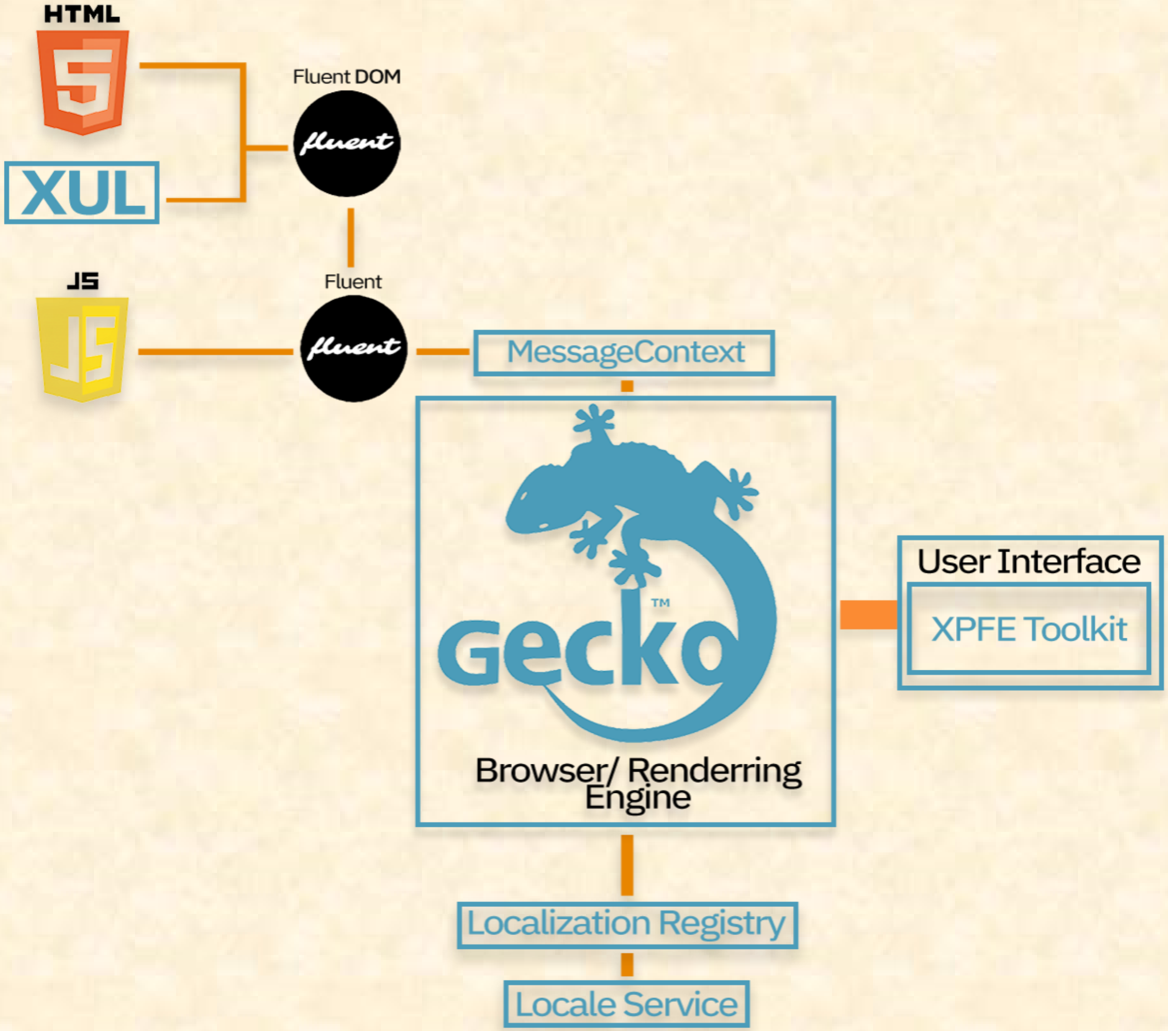
Technical Specifications

- Software Technologies
  - Python
    - Used to develop migration scripts for translating localization files from .dtd to .ftl (Fluent) format.
    - Converts variables and associated translations from .dtd into a new .ftl file.
    - When parsing invalid or incomplete .dtd files from our localizers, Firefox crashes with the “Yellow Screen of Death”. Fluent will help fix parser-based browser crashes.
  - JavaScript
    - Currently used as a part of a Fluent-based text-parser for web pages.
    - When attempting document localization, this parser searches through a document and localizes all specially marked elements.
    - Currently implements a Promise system for asynchronous translation.
  - Rust
    - Improvement upon currently implemented JavaScript-based text parser.
    - Will be transpiled into JavaScript using WebAssembly.
    - Development of Rust-based text parser in progress. Will theoretically speed up text parsing.
  - XHTML, XML & XUL
    - Mark-up and binding languages used to define the browser and user interface.
    - Uses localization information from .dtd and Fluent files to properly localize the UI.
  - Fluent
    - Tool used to improve software localization.
    - Provides an effective method for mapping complex language translations.
    - Employs modularity, simplicity, and composability for tandem use with other technologies.

Technical Specifications

- Testing Technologies
  - Mochitest Framework
    - Automated testing framework build on top of MochiKit JavaScript Libraries.
    - Used to locally create and run browser tests by simulating user activity at high speeds.
    - Displays test success or failure through the use of JavaScript function calls.
  - ESLint Engine
    - Uses a set of configuration files loaded within the Firefox codebase so JavaScript can be analyzed for errors.
    - Comprised of a set of rules which analyzes code for correctness and style consistency.
  - Try Server
    - Used to remotely test a patch before checking it into the core Firefox repository.
    - Tests patch to determine correctness and identify bugs.
    - Can view a list of issues with patch using treeherder.mozilla.org.
  - Python UI Test
    - Similar to Mochitests, yet designed to be more powerful.
    - Can restart the browser within the test.

System Architecture



HTML

XUL

Fluent DOM

JS

Fluent

MessageContext

Gecko

Browser/ Renderring Engine

User Interface

XPFE Toolkit

Localization Registry

Locale Service

System Components

- Hardware Platforms
  - Microsoft Windows
  - MacOs
  - Linux
  - Android/IOS
- Software Platforms / Technologies
  - MSYS based terminal for building Firefox on Windows
  - Mercurial VCS
  - Bugzilla ticket tracker
  - Phabricator for code review
  - Mozilla Try server and Mochitests
  - Visual Studio Code, vim, emacs, notepad++ text editors
  - Searchfox

Risks

- Large Codebase
  - An enormous code base of more than 35 million lines of code written in many programing languages
  - use searchfox.org, communicate with Firefox developers
- Asynchronization
  - The previous localization system had always translated strings synchronously
  - Searchfox and the tests run through the testing framework
- Tooling
  - Current tooling around the task of migrating the past localization system to Fluent is sparse and much has to be done by hand
  - Talking with developers involved in migrating Firefox to using Fluent and seeing what their greatest needs are
- Benchmarking Rust based Fluent Parser
  - Test the viability of a new parser written in Rust and transpiled into WebAssembly
  - Sophisticated telemetry tools

Questions?

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