(How NOT to (parse "search queries"))

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Who is this guy?

- Development Manager, CV-Library

  (We do exciting Perl stuff! We're hiring!)
- Southampton.pm
- Debian Developer (incl. pkg-perl team)
- Perl user since 2004
- Lots of other interesting things

Aim

- Interface like popular web search engines
  - Easy to learn for simple queries
  - Sufficiently flexible for advanced users
- Handle weird user input
  - Don't blow up
  - Be tolerant, DWIM, and try to serve results
- Laziness, a.k.a. maintainability

Backend

- Solr
  - Java, based on Lucene
  - HTTP API
- CPAN modules
  - WebService::Solr
  - (though keep an eye on Apache::Solr)

SolrQuerySyntax

- https://wiki.apache.org/solr/SolrQuerySyntax
- Derived from Lucene syntax

```
((foo bar)
>>> 400 Bad Request - The response
    sent by the client was
    syntactically incorrect
```

WebService::Solr::Query

- "SQL::Abstract but for Solr"
- Handles all escaping

```
my $query = WebService::Solr::Query->new(
    { -default => ['foo', 'bar'] }
);
```

But how do you turn "(foo OR bar)" into this?

Parsing Search Queries

- Plain keyword searches:

  [Perl] [Perl developer]
- Boolean logic:

  [Perl OR developer] [Perl AND developer]
- Phrase searches:

  ["Perl developer"]
- Grouping:

  [(Perl AND developer) OR (Python AND Ruby)]

Search::QueryParser

```
# See also Search::Query::Parser – very similar.
my $qp = Search::QueryParser->new();
my $s = '(foo OR bar) AND baz';

# Parses a query string into a data structure
# suitable for external search engines
my $query = $qp->parse($s)
    or die "Error in query: " . $qp->err;
```

That output format

```
{
  "+" => [
    {
      field => "",
      op => "()",
      value => {
        "" => [
          {
            field => "",
            op => ":",
            value => "foo"
...
```

Now just escape it...

```
sub _escape {
  my ( $self, $query ) = @_;

  for my $key ( keys %$query ) {
    for my $field ( @{ $query->{$key} } ) {
      if ( ref $field->{value} ) {
        $field->{value} = $self->_escape($field->{value});
      }
      else {
        $field->{value} =
          WebService::Solr::Query->escape( $field->{value} );

        $self->_modify_field($field);
      }
    }
  }

  return $query;
}
```

..then unparse it...

```
sub _unparse_query {
    my $self = shift;
    my $q    = shift;

    my @subQ;
    for my $prefix ( '+', '', '-' ) {
        next if not $q->{$prefix};
        push @subQ, $prefix . $self->_unparse_subQ($_)
            for @{ $q->{$prefix} };
    }
    return join q{ }, @subQ;
}
```

...recursively.

```
sub _unparse_subQ {
    my $self = shift;
    my $subQ = shift;

    return '('.$self->_unparse_query($subQ->{value}).')'
        if $subQ->{op} eq '()';

    my $quote = $subQ->{quote} || q{};
    return ( $subQ->{field} ? $subQ->{field} . ':' : '' )
        . "$quote$subQ->{value}$quote";
}
```

Oh wait

```
Error in query: [foo OR bar AND baz]:
cannot mix AND/OR in requests; use
parentheses

Error in query: [((foo OR bar)]:
no matching )
```

(And have you seen the code?!)

Can we do better?

- Learn about parsers
  - Udacity CS262
- Parse::Yapp
  - Parser code becomes readable
  - More powerful than Parse::RecDescent
- Simple precedence rule for AND/OR/NOT
  - NOT beats AND beats OR

Lexer

```
$parser->YYData->{INPUT} =~ s/^\s*//;
for ($parser->YYData->{INPUT}) {
    s/^(or)\b//i     and return ('OR', $1);
    s/^(and)\b//i    and return ('AND', $1);
    s/^(not|-)\b//i  and return ('NOT', $1);
    s/^\(//          and return ('LPAREN', '(');
    s/^\)//          and return ('RPAREN', ')');
    s/^("[^"]*")//   and return ('TERM', $1);
    s/^([^()\s]+)//  and return ('TERM', $1);
}
return ('', undef);
```

Grammar

```
%left OR
%left AND
%left NOT

%%

search:  LPAREN search RPAREN    { "( $_[2] )" }
    |    search OR search        { "( $_[1] OR $_[3] )" }
    |    search AND search       { "( $_[1] AND $_[3] )" }
    |    search search %prec AND { "( $_[1] AND $_[2] )" }
    |    NOT search              { "(!$_[2])" }
    |    TERM                    { "$_[1]" }
    ;
```

It still sucks

```
$ perl -MSearch -e 'Search->new->run()'

foo AND bar OR baz
>>> ( ( foo AND bar ) OR baz )

((foo bar)
>>> Syntax error.
```

This stuff is designed for compilers, not humans.

Solr's edismax parser

- https://wiki.apache.org/solr/ExtendedDisMax
- Robust, tolerant – designed for user input
- Can be configured to search multiple fields by default

Stop munging stuff in Perl – it might have been necessary before Solr 3.1, but it's not any more.

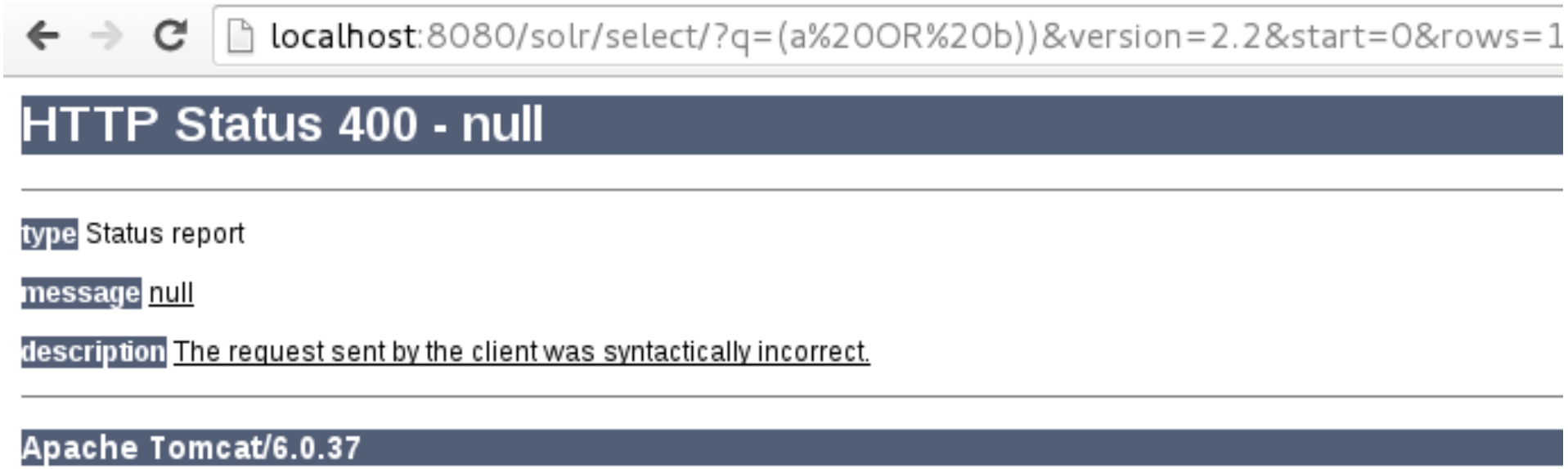
Demo

```
my $solr = WebService::Solr->new($url);

# WebService::Solr::Query objects are useful for
# 'fq' params, but avoid them for main 'q' param.
my $options = {
    fq => [WebService::Solr::Query->new(...)];
};

$solr->search($s, \%options);
```

((a OR b) - lucene


localhost:8080/solr/select/?q=(a%20OR%20b))&version=2.2&start=0&rows=1
HTTP Status 400 - null
type Status report
message null
description The request sent by the client was syntactically incorrect.
Apache Tomcat/6.0.37

((a OR b) - edismax

Questions?

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