WAP-enabling a Web Site with PHP3

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The UK Geographic Search Engine/Guide was a brainwave, the genesis of which occurred while our team was having its pre-Christmas drink in our local pub (The Park) on the day before Christmas Eve, 1999. We'd been kicking around a number of ideas about how many Internet users didn't 'get' what it could really be made to do, when the concept of removing the virtuality and injecting some *reality* just sort of bubbled up out of thin air. Some crazy ideas got discussed, and then the blinding flash of the obvious hit us: why can't you search the Internet for places based on how near they are to each other, rather than the text that documents contain?

Going from the thought to the execution always takes time, but we were lucky. As a hobby project (and mainly to learn the Qt widget set), I had already built a moving-map GPS package to run on a Linux laptop while driving. Very basic, nothing flashy, but at least it had a crude mapping engine in it. About an hour of hackery on the code hooked it into our PHP3-based contact manager software, and presto: all of our customers' offices popped up on the maps too!

Our eventual goal was to be able to go to a strange town, press the 'nearest pub' button on whatever the device was, and be shown a map showing establishments nearby, together with visitors' ratings. Having gone there, you should be able to add your own vote on the quality of the beer, the food, the surroundings and so on, then ask for the nearest good curry house and cash point to pay for the food.

> *Non-UK readers may not be aware of the mystic significance of curry and beer, but believe me, it is* extremely *important to the UK software industry. Curry houses are by far the most common food outlets in Britain. Even McDonalds has introduced a Chicken McTikka to compete; it's just as appealing as their other offerings.*

The Design

By the end of January, a rough prototype of *Somewherenear* had been built. The location data is stored in a MySQL database, and distance-based searching is performed very simply by using SQL `SELECT` statements with `WHERE` clauses that limit the latitude and longitude of the items sought. By late March, we were ready to release the thing to the world and did so, feeling pretty pleased to snaffle the domain name. We know that the radius-selection algorithms won't scale, but after chatting with Stuart Green (thanks Stuart), ex-Leeds University, we are confident that techniques used in molecular chemistry can be applied to give us very fast radius detection, at the cost of lots of disk space.

We had always planned to hook the database into location-aware devices. Whether they would be mobile phones or PDAs with GPS functionality wasn't clear, but it was obvious that before long, people would be out and about with devices that contain browsers and also know about their location. We knew that we would probably have to deliver the data in various formats. HTML was obvious, and probably WML too, along with other XML derivatives if we proved to have built a useful resource.

We had an architecture already prepared for this kind of project, based on CGI programs and pseudo-HTML templates. A description of the *TrainingPages* training search engine was written up some time ago, and has been described in a number of talks I have given. The architecture has some known deficiencies, so we thought it was time to move it up to its next stage. Its greatest weakness is that HTML ends up embedded in the CGI scripts, making them specific to the delivery format — and there's a general lack of intelligence in the template language itself.

Moving on to the next step, I decided to replace the template language with PHP3, but to enforce a rigid separation of responsibilities:

> **The CGI scripts must do all the data management; the templates must deal only with presentation.**

This rule is an absolute winner, and has proved to be hugely effective. We still write the CGI programs in C++. It's a proper, heavyweight engineering language, and frankly I still don't think that Java cuts it on the server side. C++ templates provide so much power to the designer, and the ability to use exception handling to catch errors has saved us acres of code, proving in my mind superiority over Perl or PHP3 for the core data engine.

How it Works

The CGI program runs in response to every incoming query, and is easily fast enough to fill our data pipe without having to resort to trickery like Apache modules or fastCGI. Each execution of the CGI program inspects the incoming form and uses that to decide which presentation template should be used. These presentation templates (nothing to do with the C++ `template` construct) are PHP3 pages. The CGI program's output is essentially a long list of PHP3 data definitions; here's a fragment:

```
<?
$logfilename="/www/web.places/logs/dblog";
header("Set-cookie: name=3880d6350463; expires=Saturday, 23-Mar-2002 06:08:30 GMT;
path=/");
$Mytemplate["formmethod"]="get";
$Mytemplate["sessionkey"]="3880d6350463";
$Mytemplate["retrieved_cookie_session"]="Fri Apr 21 20:11:05 2000";
$Mytemplate["lasttimeon"]="956344265";
$Mytemplate["placetype"]="1";
$Mytemplate["QUERY"]="a=show_link&unique_id=175&placetype=1";
$Mytemplate["mapimagewidth"]="292";
$Mytemplate["mapimageheight"]="219";
$Mytemplate["east"]="414996";
$Mytemplate["north"]="435499";
$Mytemplate["placename"]="Park";
$Mytemplate["title"]="Place Details, Park";
$Mytemplate["OSGB"]="SE 149 354";
$Mytemplate["latlong"]="053 48\" 55'N 001 46\" 19'W";

and so on...
```

After spitting out the data, the CGI program opens the PHP3 template file and tacks it onto the end of the data definitions, so it's acting much like the `cat` command. The whole pasted-together chunk is then sent through a pipe into the PHP3 interpreter, and the output of *that* is also piped asynchronously through `weblint` to very the quality of the HTML being generated. If `weblint` picks up any errors, it e-mails us to warn us of the fact.

All this is done for every page generated. Running on an AMD K6/250, it looks as if we can do about one page per second (including the map generation) before we would have to turn off `weblint` or look for more power.

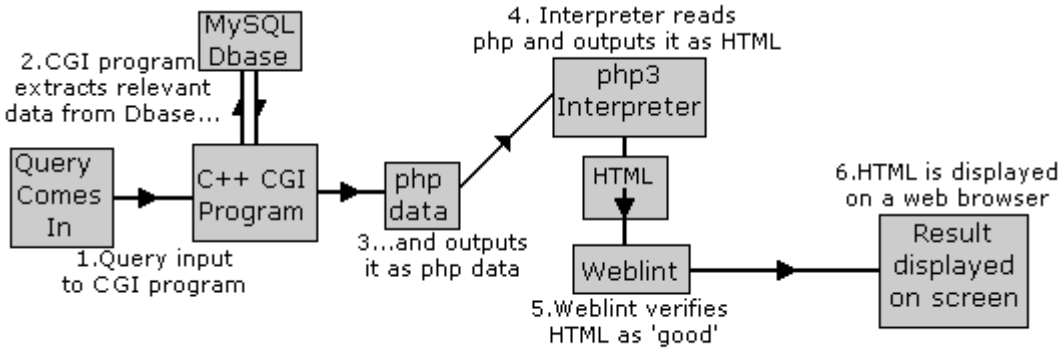
Here's a fragment from the 'place' PHP3 template, which is the one that executes if you click on the link to 'The Park' pub:

```
<?
require('stdhead.tpl');
require('stdplace.tpl');

$thisplace = new PlaceDetail();

if (isset($place)) { $thisplace->import($place[0]); }
$thistypes = new TypeList();

if (isset($type)) { $thistypes->import($type); }
$REenter = "sessionkey=" . R("sessionkey") . "&rlimit=" . R("rlimit") .
           "&east=" . R("east") . "&north=" . R("north") .
           "&unique_id=" . $thisplace->unique_id . "&placetype=" . R("placetype");

if (I("o-east")) {
   $REenter .= "&o-east=" . R("o-east") . "&o-north=" . R("o-north");
}

$basicformfields = "<input type=hidden name=a value=\"show\">\n";
$basicformfields .= "<input type=hidden name=placetype value=\"" .
   R("placetype") . "\">\n";
$basicformfields .= "<input type=hidden name=sessionkey value=\"$K\">\n";
$basicformfields .= "<input type=hidden name=rlimit value=\"" .
   $Mytemplate["rlimit"]. "\">\n";

if (I("o-east")) {
   $basicformfields .= "<input type=hidden name=o-east value=\"" .
      $Mytemplate["o-east"]. "\">\n";
   $basicformfields .= "<input type=hidden name=o-north value=\"" .
      $Mytemplate["o-north"] . "\">\n";
}

$basicformfields .= "<input type=hidden name=east value=\"" .
   $Mytemplate["east"]. "\">\n";
$basicformfields .= "<input type=hidden name=north value=\"" .
   $Mytemplate["north"]. "\">\n";
$basicformfields .= "<input type=hidden name=\"unique_id\" value=\"" .s
   $thisplace->unique_id . "\">\n";

$votepics = array("twocross.gif", "onecross.gif", "onetick.gif",
   "twotick.gif", "threetick.gif");
$votealts = array(":<", ":(", ":|", ":)", ":>");

// and a lot more besides...
```

If you don't know PHP3, this is probably a little obscure, but I thought I'd include it just in case you do. A lot of the calls like `R()`, `I()`, and so on are functions defined in `stdhead.tpl` — they extract data from the predefined arrays, but also report errors if expected data is missing, helping us to debug the interface between the CGI and the PHP.

That all works: the CGI->PHP3->`weblint`->user chain is highly effective. By having the logic in the C++ and the HTML generation in the PHP3, two people or teams can work simultaneously on the project without getting in each other's way. What's more, if you are tinkering with layout, you *know* you can't break the data engine or corrupt the database easily. This is typically *not* the case with 'traditional' PHP3 work, where data management and layout get badly intermingled. Or at least, they do when I'm writing the stuff — maybe there are some star performers who can do better; I take my hat off to them if they exist!

The following diagram summarizes the workings of the application:



Switching to WML

After we got the HTML site going, the next task was to make it deliverable as WML. The first concern was how much we would have to hack PHP3 to tell it not to emit a first line that says:

```
Content-type: text/html
```

Although I couldn't find it documented anywhere, I found to my deep and abiding joy that if you use the PHP3 `header()` function to output a different content-type header, the default one is suppressed. Bingo! Every WML deck now includes this PHP fragment at the top:

```
<?
   header("Content-type: text/vnd.wap.wml");
   echo "<?xml version=\"1.0\"?>\n";
   echo "<!DOCTYPE wml PUBLIC \"-//WAPFORUM//DTD WML 1.1//EN\"" .
      " \"http://www.wapforum.org/DTD/wml_1.1.xml\">\n";
?>
```

And that deals with all the usual crud you have to cough out in order to get started with WAP. From there on it was plain sailing. It took six hours to (a) learn enough WML to get something done, and (b) implement it. I used Steve Mann's book *Programming Applications with the Wireless Application Protocol* (Wiley, 0-471-32754-9) as my reference, plus a few downloaded tutorials for backup. I wouldn't recommend any of them. Considering how restricted the WML language is, you would have thought it wouldn't take much explaining, but I have yet to see a decent tutorial. Maybe I'm just too dim to pick it up easily. That might also account for the limitations of our current WAP version of the site.

Of course, you can't rely on WML being correct without testing it. If there *is* a WML `weblint`-alike, I'd like to find it, but then I haven't looked very hard yet. It would be a big help to ensure that the WML is well formed on the way out.

You also have to check that your WAP site 'works' (to the degree that you can make anything work through such a limited medium). There are a number of WAP phone simulators around, including the web-based one at www.gelon.net, as well as others from Phone.com and the marvelously named Slob-Trot from Finland. Sadly, the latter two only run under Windows (as far as I can tell), but vmware came to the rescue. Or at least, it did for the Slob-Trot browser; the Phone.com version ran but didn't paint any images on the screen. I later found a native Windows machine, and it seemed OK on that.

Using the simulators to test the WML allowed the PHP3 templates to be written very quickly. Here is the full 'place' template:

```
<?
require("stdwaphdr.tpl");
require('stdplace.tpl');
?>

<? $votepics = array("xx", "x", "+", "++", "+++"); ?>
<card title="Search results" id="first">
<p>
<?htmTplacetypename();?>(s) near <? htmT("placesearch"); ?><br/>
<? if(isset($places)): ?>
   <? $placelist = new PlaceList; $placelist->import($places);
      $placelist->reset(); $count = 1; while($place = $placelist->next()): ?>
      <? echo htmlspecialchars("\"$place->name\", " . $place->county_address());?>
      <? printf("(%.2fm) ", ($place->distance_km()*100/1.6)/100); ?><br/>
      <? if(isset($Objects[$place->unique_id . "votes"])) {
         $arrayref = $Objects[$place->unique_id. "votes"];
         // echo "Scores:";
         $first = 1;
         while(list($key, $value) = each($arrayref)) {
            $idx = $value - 1;
            if($idx < 0)
               continue;
            $vname = $Objects["voteranktoshortnames"][$key];
            if ($first) { $first = 0; } else { echo ", "; }
            if (($idx < sizeof($votepics)) && ($idx >= 0)) {
               echo "$vname $votepics[$idx]";
            } else {
               error("Vote value out of range");
            }
         }
         echo "<br/>\n";
      } else {
         // echo "No votes yet<br/>\n";
      } ?>
   <? endwhile; ?>
<? else: ?>
      No matches!
<? endif; ?>
Go back<anchor title="back"><prev></prev></anchor>
</p>
</card>

<?
require("stdwapftr.tpl");
?>
```

Conclusions

If you follow the path of separating the data management from the presentation, it's dead easy. Our approach works fine for us, and we can easily add features to the WAP part of the site to bring it up to a similar spec to the main HTML site. Whether we would want to is another matter. WML is pretty ropey, and it's my own opinion that people used to HTML browsers will be extremely frustrated if they get suckered by the hype about surfing the Net from your mobile phone. Screens the size of typical a mobile phone's are nigh-on unusable, and devices with more real estate will have enough power to run HTML browsers. The data compression of the WAP protocol is another thing — couple that with HTML, and you will have something much more interesting.

The drawbacks that I've seen from using PHP3 in this fashion are minor. The `htmlspecialchars()` function in PHP3 doesn't deal correctly with the WML entities that need escaping, but I intend to write my own version and put it in the `stdwaphdr.tpl` include file. If PHP3 finds a syntax error, it tries to be nice and tell the user about it via the browser — but it outputs HTML, not WML. That's hardly a showstopper if you've got your PHP3 code right in the first place, but if it does happen, the user's WAP browser will choke. I'm told that WAP phones are even less reliable than Windows at the moment: an article in May's UK Personal Computer World describes having to remove the battery from the phone when it gets wedged!

For now, though, I'm happy with the result of our efforts. It works, it's simple, and I'm sure we will be doing more with it.

Resources

If you want a copy of the templates used on the WAP site, I've prepared a `gzip`'ed TAR file of them that you can use for information. You can find it at http://somewherenear.com/wap/templates.tgz

Note that the server will serve them up as `text/plain`, so click on Save As and drop the file into an appropriate directory before unpacking it. The files will unpack into the current directory, so make sure you put the archive somewhere sensible first. If you spot any errors, I'd love to know.

Other sites used:

MySQL: http://mysql.com
Gelon: http://www.gelon.net
Phone.com: http://phone.com
AnywhereYouGo: http://www.anywhereyougo.com
vmware: http://www.vmware.com
Slob-Trot: http://www.slob-trot.com
PHP: http://www.php.net