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The Church of Jesus Christ of Latter-day Saints

NON-QUERY OPTIMIZATION

QUERY AVOIDANCE STRATEGIES & PATTERNS



The problem

- Site statistics and historical data indicated the need for an **order of magnitude** better performance to accommodate projected loads
- MarkLogic Server 4.1-9
- Cluster:
 - 3 E-nodes
 - 2 D-nodes



What do we optimize?

- ⦿ **Instrument code**, but be able to easily comment it out before sending it live.
- ⦿ Start with:
 - Entry points
 - Suspicious code segments
 - Highly repeated code
 - All database queries
- ⦿ Code instrumentation works but it needs:
 - **Very large data sets**
 - A good **load** simulation

Non-Query Optimization Patterns & Practices



- ◎ **CODify**
- ◎ Lazy Daze
- ◎ Statify
- ◎ Model Mania
- ◎ Complicate
- ◎ Quasi-Query & Force Fields
- ◎ Replicants
- ◎ AJAXify

CODIfy your application



◎ **C**ompute

◎ **O**nce

◎ **D**eliver

◎ **I**nfinite

Lazy Daze



◎ Single cache:

(: Lazy-load: Use getConfig(), not \$_config. :)

```
declare private variable $_config := ();
```

```
declare function getConfig() as element(config) {  
  if($_config)  
  then $_config  
  else  
    let $config := /config  
    let $save := xdmp:set($_config , $config)  
    return $config  
};
```

Lazy Daze



Multiple cache:

(: Lazy-load: Use `getPerson($name)`, not `$_personMap`. :)

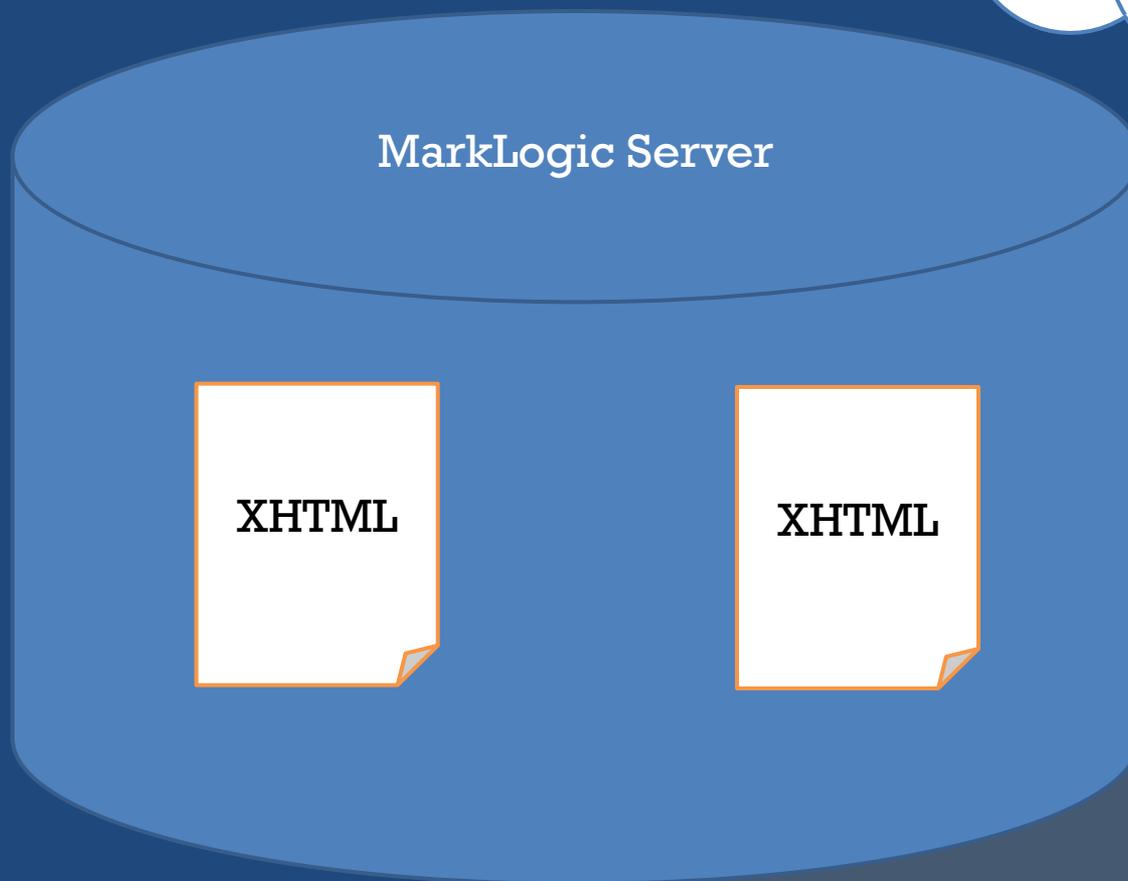
```
declare private variable $_personMap := map:map();
```

```
declare function getPerson($name as xs:string) as element(person) {  
  let $person := map:get($_personMap,$name)  
  return  
    if($person) then $person else  
      let $p := /person[@name = $name]  
      let $cache := map:put($_personMap,$name,$p)  
      return $p  
};
```

Frequently Asked Questions

TOPICS	QUESTIONS	ANSWERS
About Mormons > Baptism Bible Book of Mormon Church Culture Death Eternal Life Faith Family Health Heavenly Father Holy Ghost Homosexuality Humanitarian Services Jesus Christ Joseph Smith Marriage Missionaries Morality	Are Mormons Christians? > <p>Do Mormons regard the Bible as Holy Scripture and the word of God?</p> <p>How can I learn more about the Mormon Church? How can I find someone to talk with, in person, about the Mormon religion?</p> <p>What do Mormons believe about the Bible? Do they regard it as Holy Scripture and the word of God?</p> <p>What is Mormonism? OR What do Mormons believe?</p> <p>Who are the Mormons?</p> <p>Who started/founded the Mormon Church?</p>	<h3>Are Mormons Christians?</h3> <p>Gordon B. Hinckley, prior President of The Church of Jesus Christ of Latter-day Saints (1995–2008), said:</p>  <p>"We are Christians in a very real sense and that is coming to be more and more widely recognized. Once upon a time people everywhere said we are not Christians. They have come to recognize that we are, and that we have a very vital and dynamic religion based on the teachings of Jesus Christ. We, of course, accept Jesus Christ as our Leader, our King, our Savior...the dominant figure in the history of the world, the only perfect Man who ever walked the earth, the living Son of the living God. He is our Savior and our Redeemer through whose atoning sacrifice has come the opportunity of eternal life. Members of The Church of Jesus Christ of Latter-day Saints pray and worship in the name of Jesus Christ. He is the center of our faith and the head of our Church. The Book of Mormon is Another Testament of Jesus Christ and witnesses of His divinity, His life, and His Atonement."</p> <p>Read answers from other Mormons...</p>  <p>VIEW ALL ANSWERS</p>

Statisfy



Statisfy



- ⦿ **Pre-generate** pages from a template. Rather than dynamically enhancing a page at page request time, pre-generate a **static page** when the dynamic data changes.
- ⦿ The static page can be **directly served at request time** without incurring the costs of hitting the database for all the dynamic data.
- ⦿ May **regenerate every so often** to keep queried data fresh.

CHAT WITH US 



Hi, I'm David

I am a website architect and developer . I'm a Mormon.

SHARE +

About Me

I love to play racquetball, road-bike, and camp. I develop websites and software by trade. Many people think I have too many children (six), but I wouldn't trade any of them for anything. Each one is precious and different. Each on has taught me lessons and brought me joy in their own ways. I am looking forward to having grandchildren in the near future, although none of my children have plans for marriage yet. Life is good.

Why I am a Mormon

Being Mormon and living a life that emulates Christ was something I grew up with, but as I have matured and investigated for myself, I know that living up to a high moral standard brings me peace, joy, and helps me to avoid life difficulties. I think inner peace is very hard to find any other way in this crazy, non-stop, world.

Frequently Asked Questions

Why is family so important to Mormons?

The family unit is the central organization of our religion. It is the central focus of God's plan. It is also destined to continue after our lives on this earth, should we take advantage of repentance, Christ's atonement, and the sealing power of the priesthood.

Personal Stories

What has helped develop greater harmony in your home?

Reading scripture every morning as a family has provided the best safeguards against the difficulties and evils of the day. When we as a family have consistently spent that time focusing on gospel teachings of the Savior, things just go smoother, relationships are improved, and we experience more peace in the home.

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MEET MORMONS

Discover Mormons who share your personal experience:

Select a Gender 

Select Age 

Select an Ethnicity 

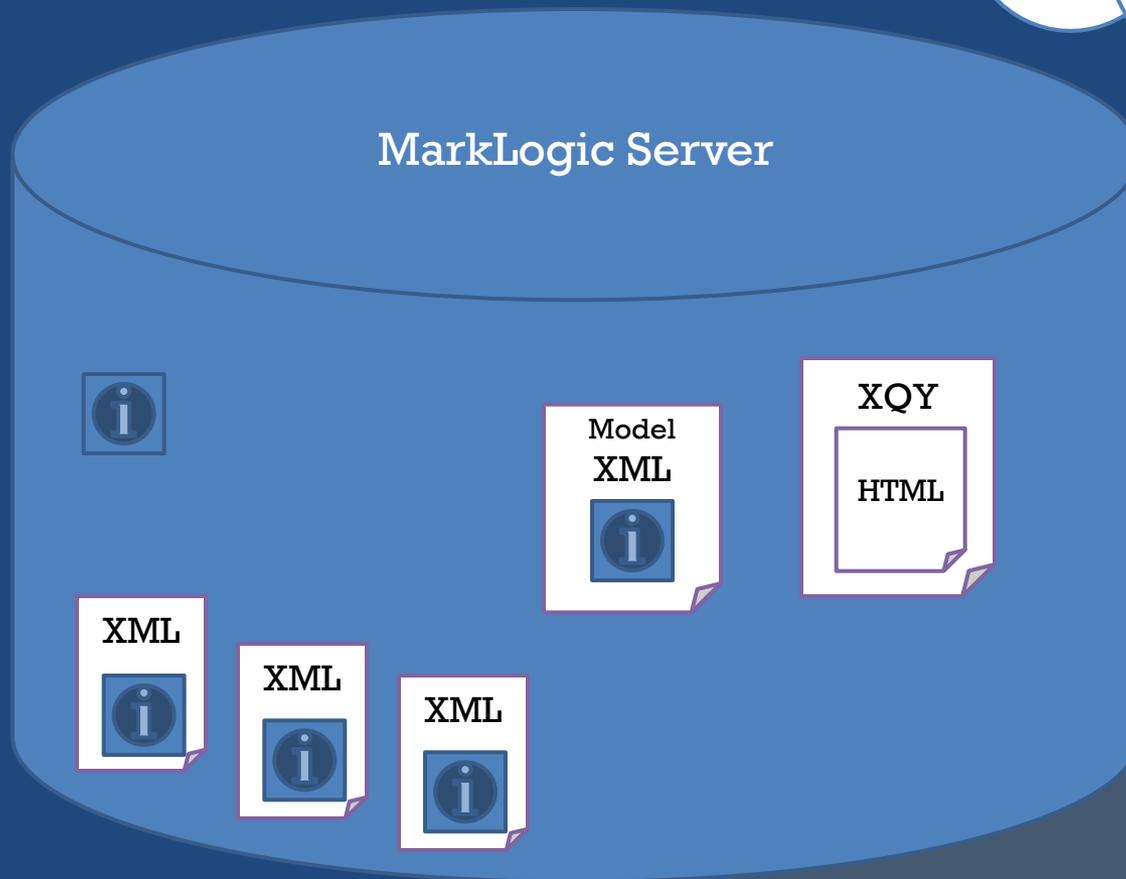
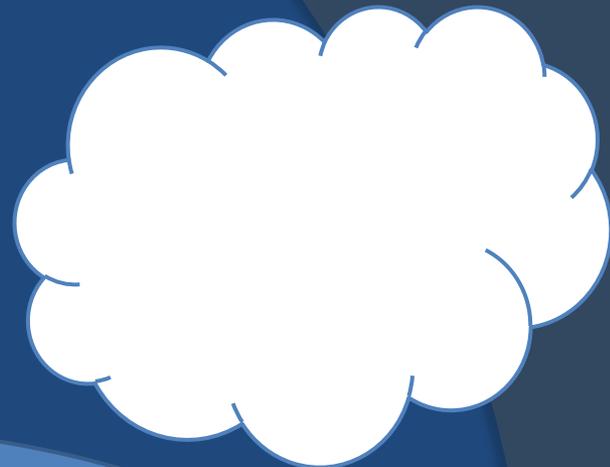
Enter name or keyword

SEARCH

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FIND A MORMON CHURCH

Model Mania



Model Mania



- ⦿ At data change time, generate an **xml model of data** specific to a particular page type or a set of related pages
- ⦿ The XQuery page(s) only have to request **one document** from the database to fill in all the dynamic data.
- ⦿ Especially useful when data is gathered/filtered from many documents or from **complex searches**.

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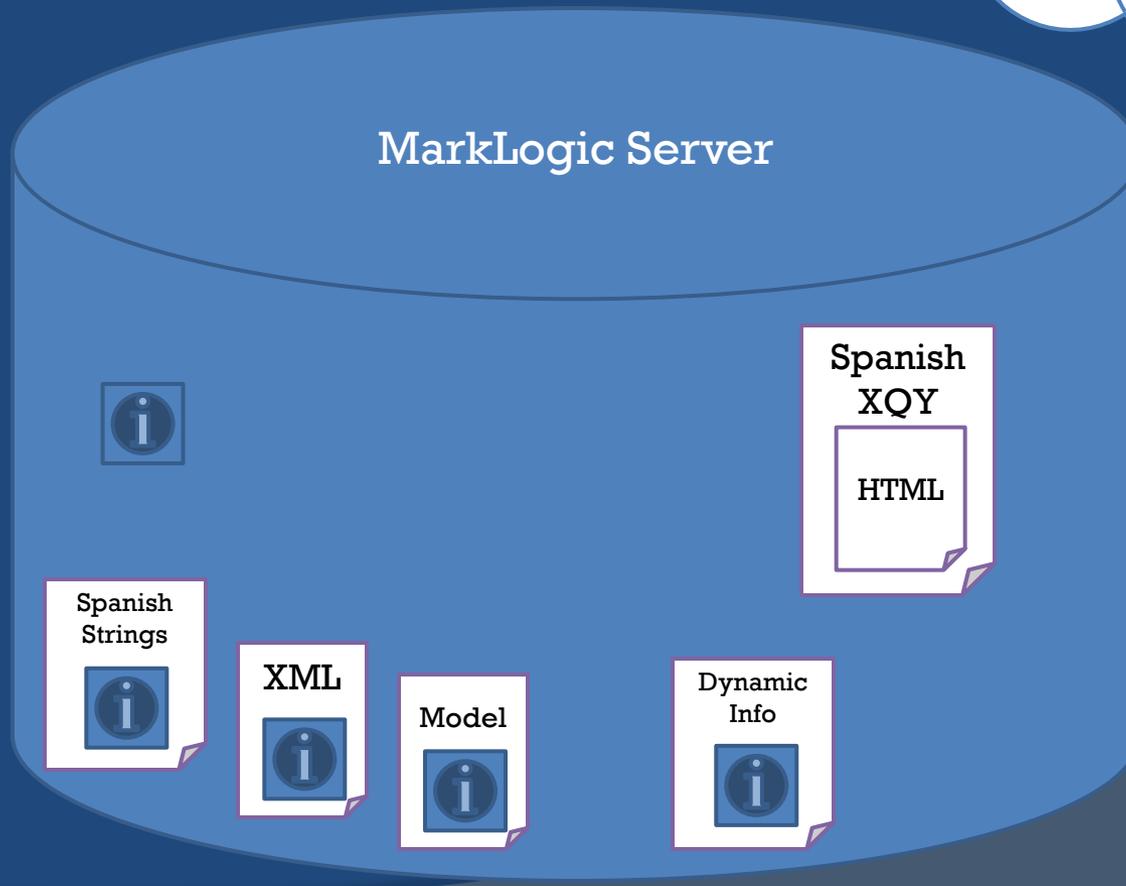
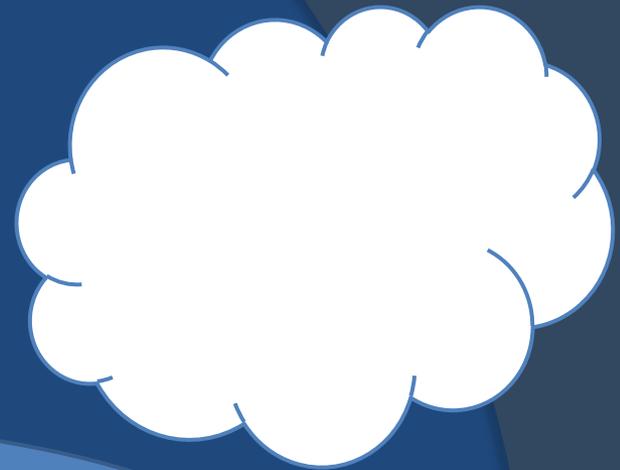
SEARCH

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FIND A MORMON CHURCH

Complicate

XHTML



Complicate



- ⦿ Generate **XQuery code**, pre-generating as much as possible, only keeping dynamic data to be replaced at request time.
- ⦿ Drawback of this is **clearing the cache** of compiled code in the Modules db. Compile at times when there is low load.

Quasi-Query / Force Fields



- ◎ Turn documents into **XQuery variables**.
 - In MarkLogic Server **4.1** and below **generate XQuery files** and insert them into the modules database when changes are made in database (we use CPF to detect the changes to data).
 - In MarkLogic Server **4.2** and above, use **xdmp:set-server-field** and **xdmp:get-server-field** to change application settings.
 - Use pre-generated **maps for speed**
- ◎ Turn some xml into **XQuery function(s)**.

Replicants (thinking out of the box)



- ① Use a good **caching appliance** and/or take advantage of the browser cache.
- ② Control **caching policies**.
- ③ **Stream** binary/static/pre-generated files directly out of the file system rather than a modules database. (MarkLogic future release will help).
- ④ Use a different **application server** (like Apache) to serve the static files and reduce load on the MarkLogic cluster.

AJAXify



- ⦿ Have xhtml pages static & cached, but only get/put data (XML or JSON) from MarkLogic Server through web services.
- ⦿ AJAX and Javascript do the work client-side (client side controller pattern)

AJAXify

MarkLogic Server

Page XQY

HTML

Service
XQY

XML
or
JSON

Cache Server

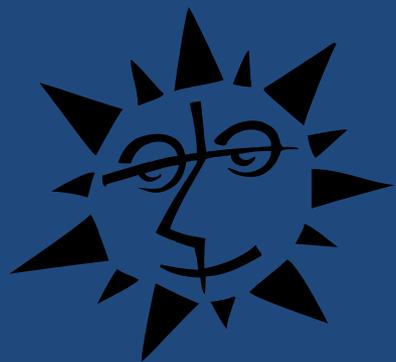
HTML

XML
or
JSON



Scalability Improvement?

- ◎ Concurrent users went from 500 to more than 20,000+
- ◎ CPU utilization and server load were dramatically reduced from critical to 50% CPU and 1.5 server load
- ◎ Caching appliance hits 60% to 98.3%
- ◎ Very little change to functionality and site freshness to get the gains
- ◎ No need to alter cluster



CODIfy!

Questions:

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Goodies:

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