gin如何实现HttpServer

如何构建一个Http Server

golang标准库封装了一个http库，可以用于构建Http Server。参看下面的代码

```
package main

import "net/http"
import "fmt"

type MyHandler struct {}

func (that *MyHandler) ServeHTTP(w http.ResponseWriter, req *http.Request)
{
    fmt.Println("path is ", req.URL.Path)
    switch req.URL.Path {
    case "/list":
        w.WriteHeader(200)
        fmt.Fprintf(w, "%s", "you request list")
    case "/form":
        w.WriteHeader(200)
        fmt.Fprintf(w, "%s", "you request form")
    default:
        w.WriteHeader(400)
        fmt.Fprintf(w, "%s", "not found your request")
    }
}

func main() {
  // 创建一个http.Server对象
    server := http.Server{
        Addr: ":8080",
        Handler: &MyHandler{},
    }
  // 调用http.Server对象的ListenAndServe方法
    server.ListenAndServe()
    fmt.Println("Server is running on port 8080")
}
```

http提供了另外一种简洁一些的写法

```
package main

import "net/http"
import "fmt"

type MyHandler struct {}
```

```
func (that *MyHandler) ServeHTTP(w http.ResponseWriter, req *http.Request)
{
    fmt.Println("path is ", req.URL.Path)
    switch req.URL.Path {
    case "/list":
        w.WriteHeader(200)
        fmt.Fprintf(w, "%s", "you request list")
    case "/form":
        w.WriteHeader(200)
        fmt.Fprintf(w, "%s", "you request form")
    default:
        w.WriteHeader(400)
        fmt.Fprintf(w, "%s", "not found your request")
    }
}

func main() {
    http.ListenAndServe(":8080", &MyHandler{})
    fmt.Println("Server is running on port 8080")
}
```

第二种写法简洁一些，实质上是第一种写法。在http.ListenAndServe构建了http.Server对象，然后调用http.Server对象的ListenAndServe方法，http.ListenAndServe的源码如下：

```
// ListenAndServe always returns a non-nil error.
func ListenAndServe(addr string, handler Handler) error {
    server := &Server{Addr: addr, Handler: handler}
    return server.ListenAndServe()
}
```

gin

怎么使用gin来构建一个Http Server

```
package main

import "github.com/gin-gonic/gin"

func main() {
  r := gin.Default()

    r.GET("/list", func(c *gin.Context) {
        c.JSON(200, "you request list")
    })
    r.GET("/form", func(c *gin.Context) {
        c.JSON(200, "you request form")
    })
    r.Run(":8080") // listen and serve on 0.0.0.0:8080 (for windows
```

```
"localhost:8080")
}
```

gin是如何组织路由的

一、Engine结构体

Engine是gin框架的实例，包含了muxer, middleware and configuration settings。 可以通过调用`New()`和`Default()`方法来创建

```
// Engine is the framework's instance, it contains the muxer, middleware
and configuration settings.
// Create an instance of Engine, by using New() or Default()
type Engine struct {
    RouterGroup

    // Enables automatic redirection if the current route can't be matched
but a
    // handler for the path with (without) the trailing slash exists.
    // For example if /foo/ is requested but a route only exists for /foo,
the
    // client is redirected to /foo with http status code 301 for GET
requests
    // and 307 for all other request methods.
    RedirectTrailingSlash bool

    // If enabled, the router tries to fix the current request path, if no
    // handle is registered for it.
    // First superfluous path elements like ../ or // are removed.
    // Afterwards the router does a case-insensitive lookup of the cleaned
path.
    // If a handle can be found for this route, the router makes a
redirection
    // to the corrected path with status code 301 for GET requests and 307
for
    // all other request methods.
    // For example /FOO and /..//Foo could be redirected to /foo.
    // RedirectTrailingSlash is independent of this option.
    RedirectFixedPath bool

    // If enabled, the router checks if another method is allowed for the
    // current route, if the current request can not be routed.
    // If this is the case, the request is answered with 'Method Not
Allowed'
    // and HTTP status code 405.
    // If no other Method is allowed, the request is delegated to the
NotFound
    // handler.
    HandleMethodNotAllowed bool
    ForwardedByClientIP    bool
```

```
    // #726 #755 If enabled, it will thrust some headers starting with
    // 'X-AppEngine...' for better integration with that PaaS.
    AppEngine bool

    // If enabled, the url.RawPath will be used to find parameters.
    UseRawPath bool

    // If true, the path value will be unescaped.
    // If UseRawPath is false (by default), the UnescapePathValues
effectively is true,
    // as url.Path gonna be used, which is already unescaped.
    UnescapePathValues bool

    // Value of 'maxMemory' param that is given to http.Request's
ParseMultipartForm
    // method call.
    MaxMultipartMemory int64

    // RemoveExtraSlash a parameter can be parsed from the URL even with
extra slashes.
    // See the PR #1817 and issue #1644
    RemoveExtraSlash bool

    delims           render.Delims
    secureJsonPrefix string
    HTMLRender       render.HTMLRender
    FuncMap          template.FuncMap
    allNoRoute       HandlersChain
    allNoMethod      HandlersChain
    noRoute          HandlersChain
    noMethod         HandlersChain
    pool             sync.Pool
    trees            methodTrees
}
```

二、如何注册路由

通过调用`r.HttpMethod(path, ginRouterHandler)`方法来注册路由，r是`Engine`结构体的对象，`HttpMethod`表示`GET、POST、PUT`等方法。

`Engine`本身没有实现`HttpMethod`，而是继承了`RouterGroup`，`RouterGroup`实现了这些方法。

`RouterGroup`用来配置router，关联了path和handlers。下面是`RouterGroup`的结构。

```
// RouterGroup is used internally to configure router, a RouterGroup is
associated with
// a prefix and an array of handlers (middleware).
type RouterGroup struct {
    Handlers HandlersChain    // HandlersChain是ginHandler的数组，参看下面的代
码
    basePath string
```

```
    engine   *Engine
    root     bool
}
```

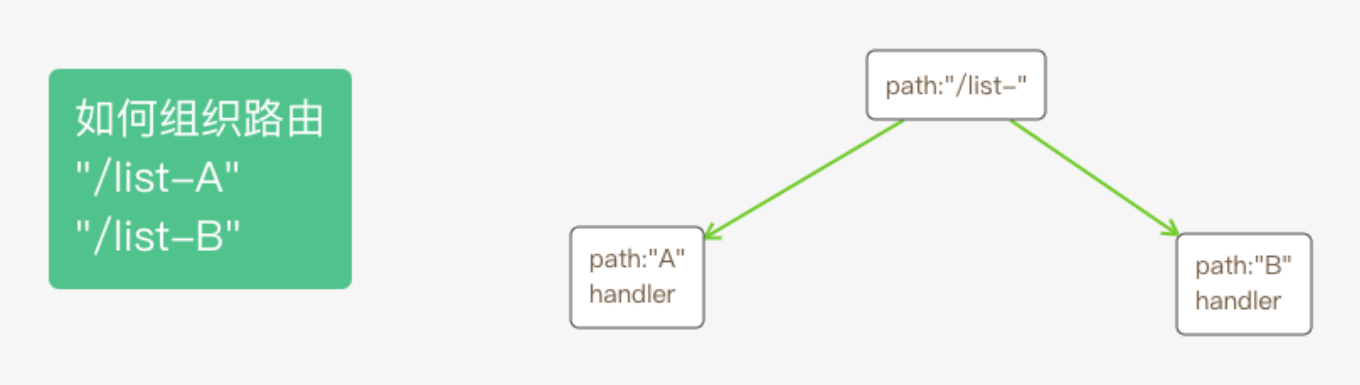
了解怎么注册路由之前，先了解Engine结构体的中trees属性，trees属性的类型是methodTrees。下面是methodTrees的结构。

```
type node struct {
    path      string
    indices   string
    children  []*node
    handlers  HandlersChain
    priority  uint32
    nType     nodeType
    maxParams uint8
    wildChild bool
    fullPath  string
}

type methodTree struct {
    method string
    root   *node
}

type methodTrees []methodTree
```

methodTree结构体有method和root属性。method是"GET"、"POST"等字符串，可参看标准库http.method文件。 root是一个树的根结点，该树用于维护method指定的请求方法的所有路由。 下图展示的是如何组织"/list-A"和"/list-B"的



注册路由的方法就是维护了trees属性的数据。

三、如何注册中间件

gin中handler类型定义如下：

```
type HandlerFunc func(*Context)
```

中间件也是一个handler，通过调用`Use(hanlder)`方法来注册中间件。`RouterGroup`结构体中有`Handlers`属性用于存储中间件handler。

对于`node`结构体，`handlers`属性用于存储该路由的所有handler。 在注册路由时，gin会将中间件的所有handler复制一份，然后连接路由的handler，存储到`node`结构体中的`handlers`属性中。

四、如何监听端口

上面描述了gin如何组织维护中间件以及路由，gin是如何监听端口号的呢？ 通过调用`engine.Run(":8080")`方法来监听端口号的。

```
// Run attaches the router to a http.Server and starts listening and
serving HTTP requests.
// It is a shortcut for http.ListenAndServe(addr, router)
// Note: this method will block the calling goroutine indefinitely unless
an error happens.
func (engine *Engine) Run(addr ...string) (err error) {
    defer func() { debugPrintError(err) }()

    address := resolveAddress(addr)
    debugPrint("Listening and serving HTTP on %s\n", address)
    err = http.ListenAndServe(address, engine)
    return
}
```

`http.ListenAndServe(address, engine)`是Golang标准库代码，`Engine`结构实现了标准库中的`Hanlder`接口，`Hanlder`接口定义如下：

```
type Handler interface {
    ServeHTTP(ResponseWriter, *Request)
}
```

理解难点：gin组织维护路由以及从路由中找到相应接口的handler，这两部分比较难。