.NET Conf China
2022

基于YARP打造扩展性极强的云原生网关 Ingress Controller

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什么是YARP

什么是YARP (Yet Another Reverse Proxy)

A toolkit for developing high-performance HTTP reverse proxy applications.

YARP (Yet Another Reverse Proxy) is a highly customizable reverse proxy built using .NET.

The biggest differentiator between YARP and other reverse proxies is how it is built and packaged – YARP is supplied as a library and samples showing how to create a proxy that is customized to the needs of your specific scenarios.

YARP的特性

高性能

高扩展性

开源

开源

基于 MIT 协议

基于新一代的跨平台的 .NET

提供了完善的文档和样例代码

贡献代码 or 自行扩展

高性能

性能测试

主机配置

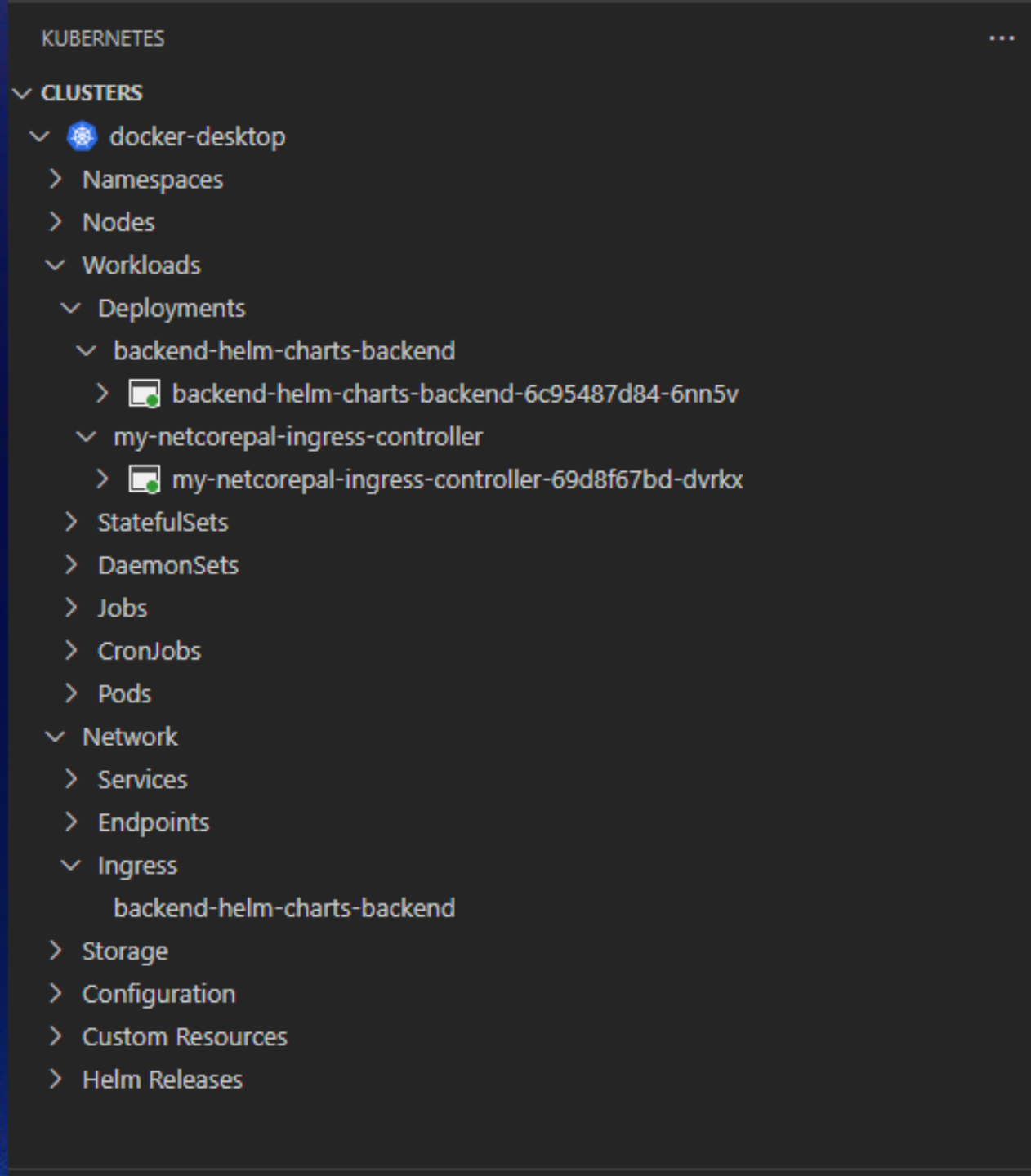
处理器　AMD Ryzen 7 3700X 8-Core Processor　3.60 GHz
机带 RAM　32.0 GB
系统类型　64 位操作系统, 基于 x64 的处理器

软件

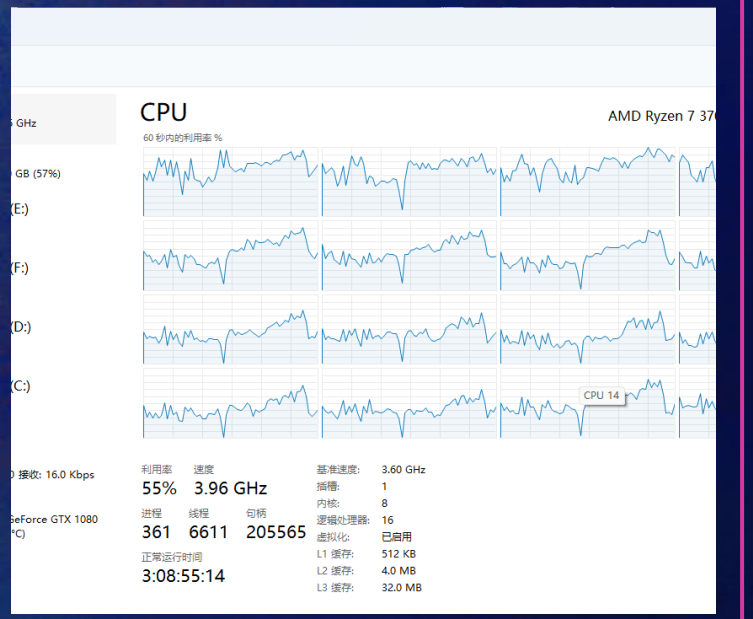
Docker Desktop 4.14.1 (91661) WSL 2 based engine
Kubeneteres v1.25.2
Jmeter 5.5

测试说明

ASP.NET Core 作为后端应用，不限定资源
用例：short-text（响应 “Hello World!” ）、long-text（12.2kb）
NetCorePal Ingress Controller 作为网关，不同资源情况下测试
后端应用、网关、压测工具运行在同一台主机

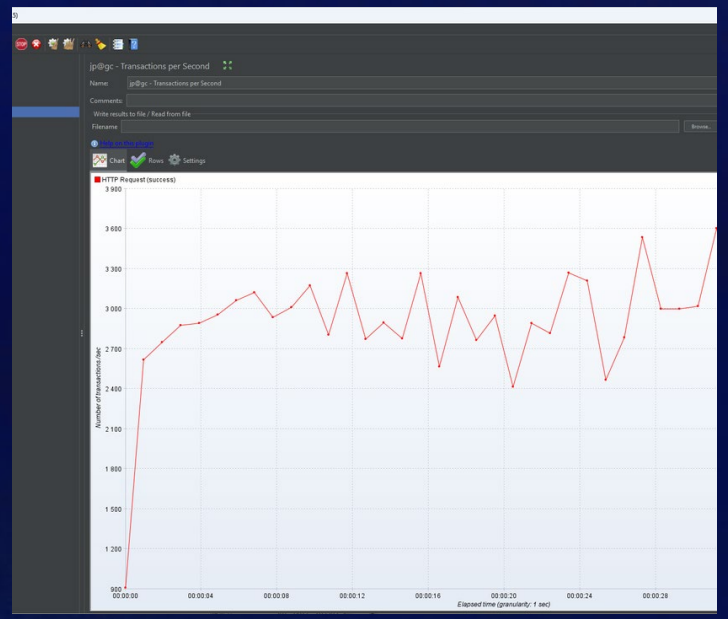


限定资源 1C1G-short-text



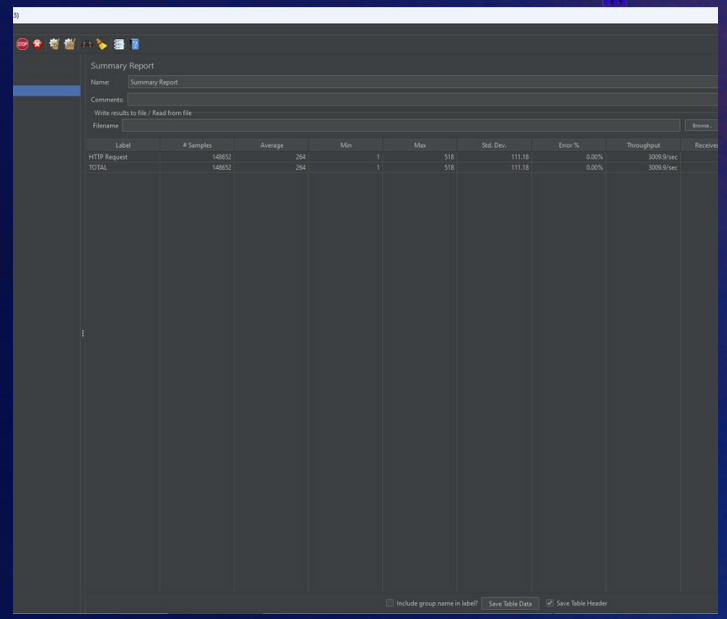
CPU 使用率

55%



TPS

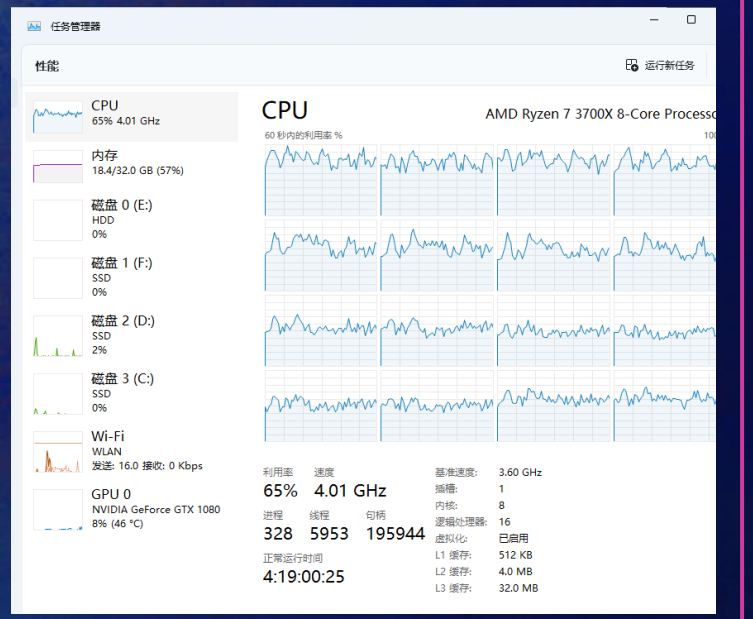
峰值: 3600 Transactions per Second

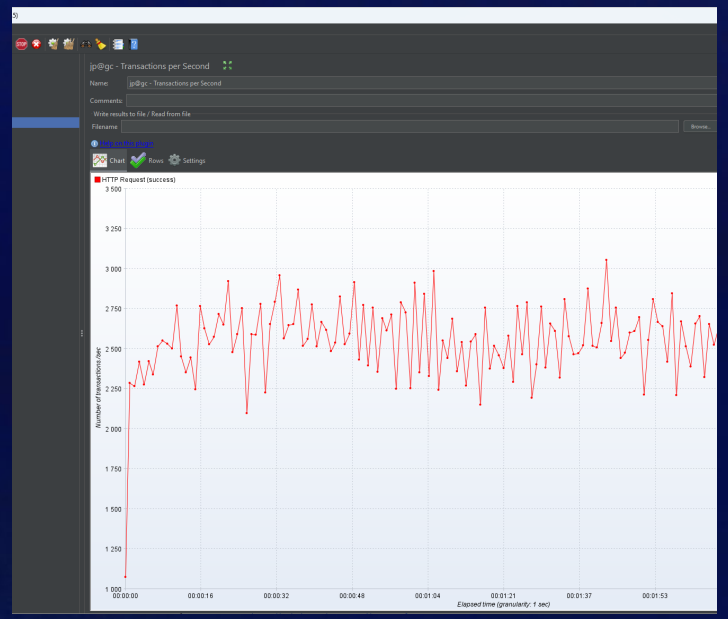


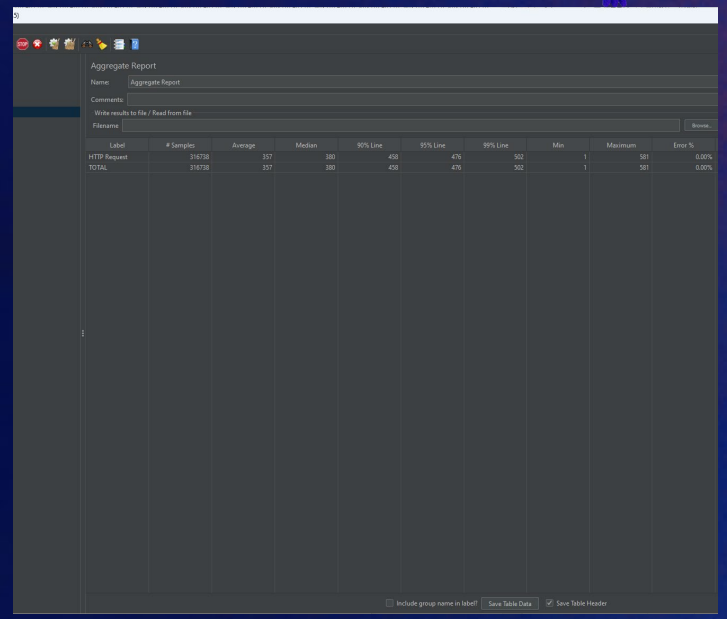
响应时间

Min: 1 ms
Max: 518 ms
Average: 264 ms

限定资源 1C1G-long-text







CPU 使用率

65%

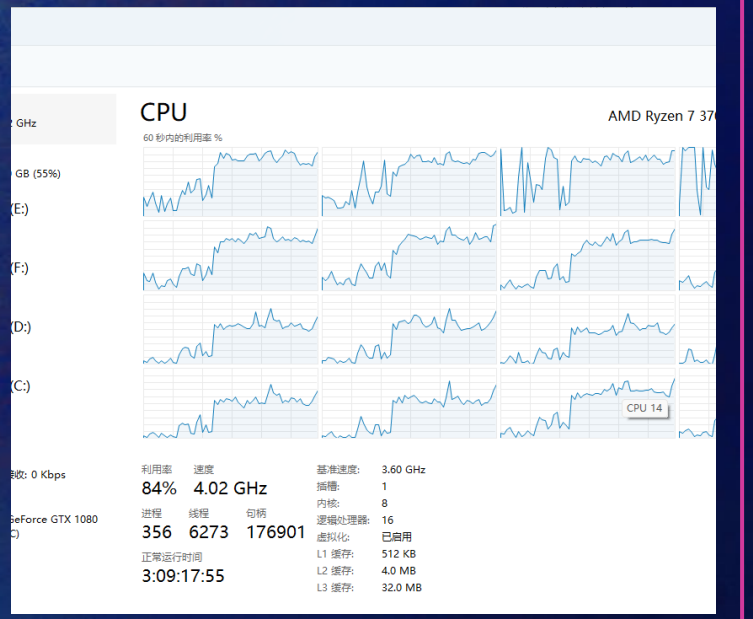
TPS

峰值: 3050 Transactions per Second

响应时间

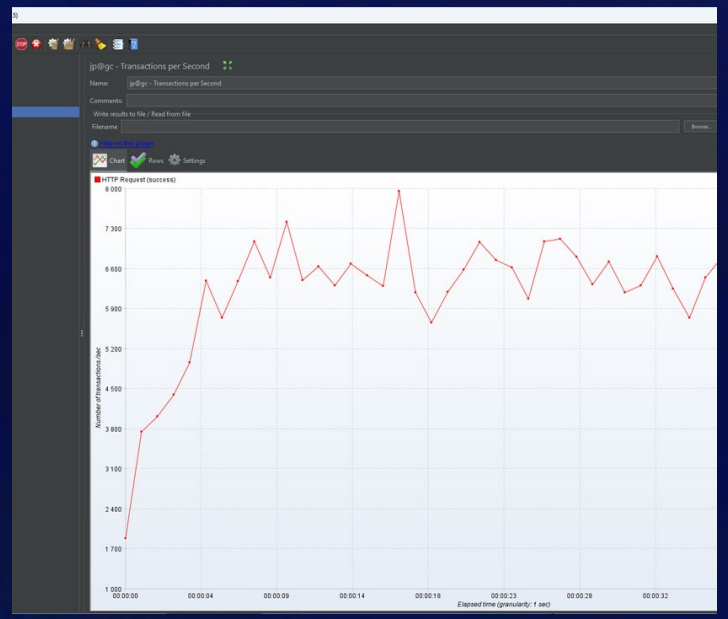
Min: 1 ms
Max: 581 ms
Average: 357 ms

限制资源 2C1G-short-text



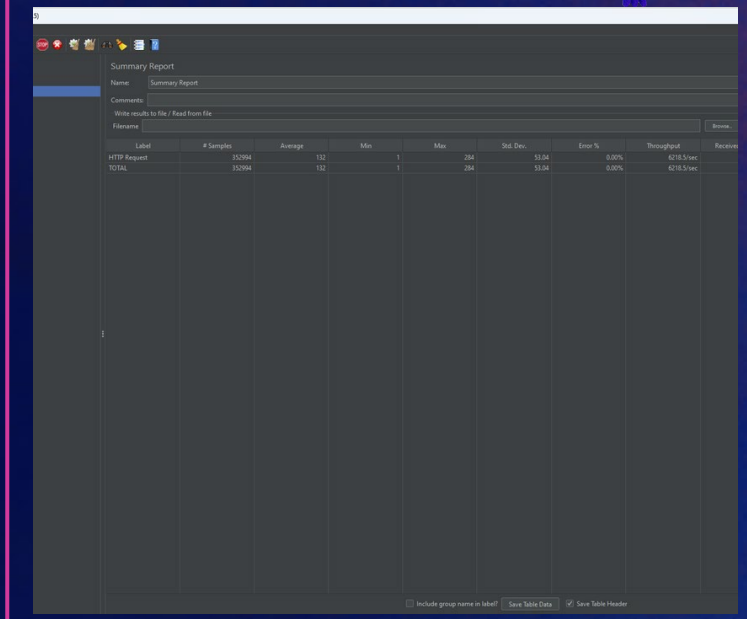
CPU 使用率

84%



TPS

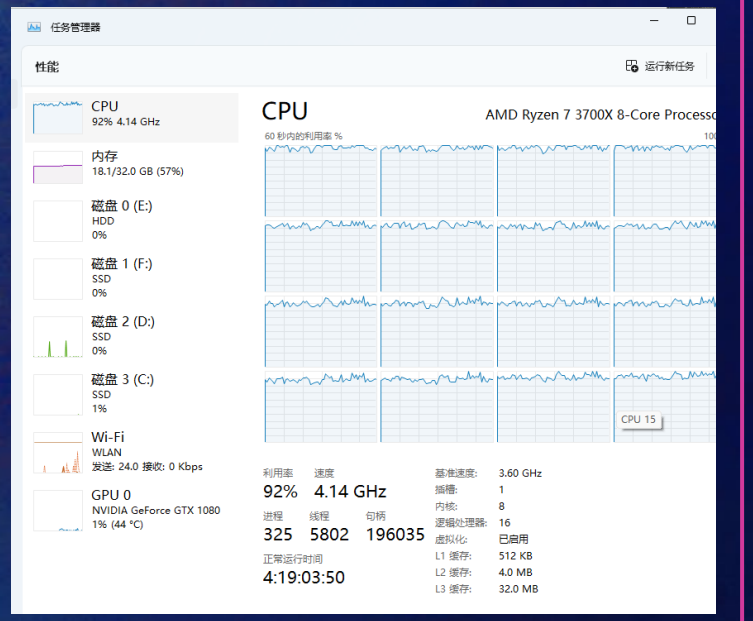
峰值: 8000 Transactions per Second

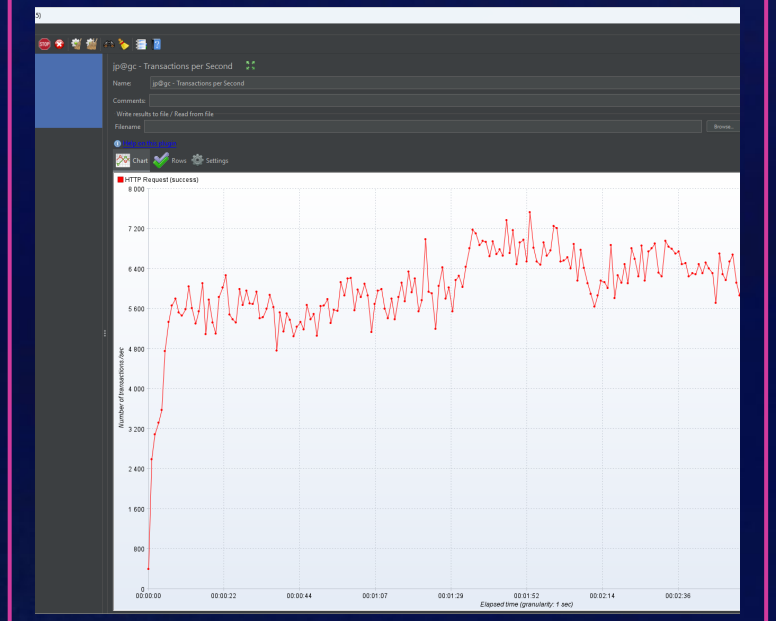


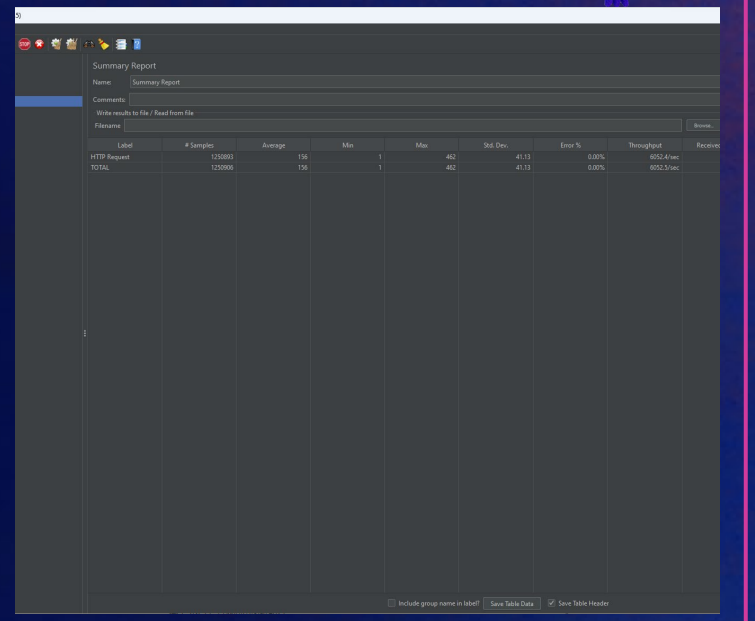
响应时间

Min: 1 ms
Max: 284 ms
Average: 132 ms

限制资源 2C1G-long-text







CPU 使用率

92%

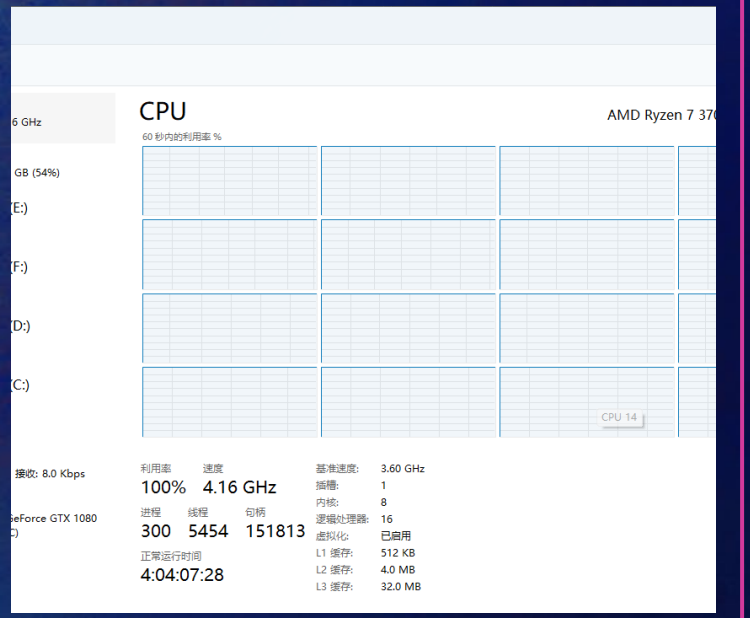
TPS

峰值: 7600 Transactions per Second

响应时间

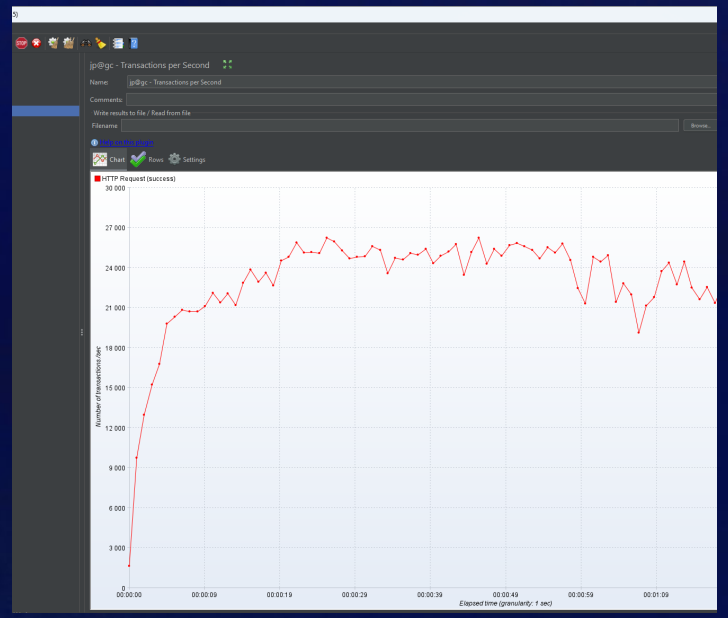
Min: 1 ms
Max: 462 ms
Average: 156 ms

nolimit-short-text



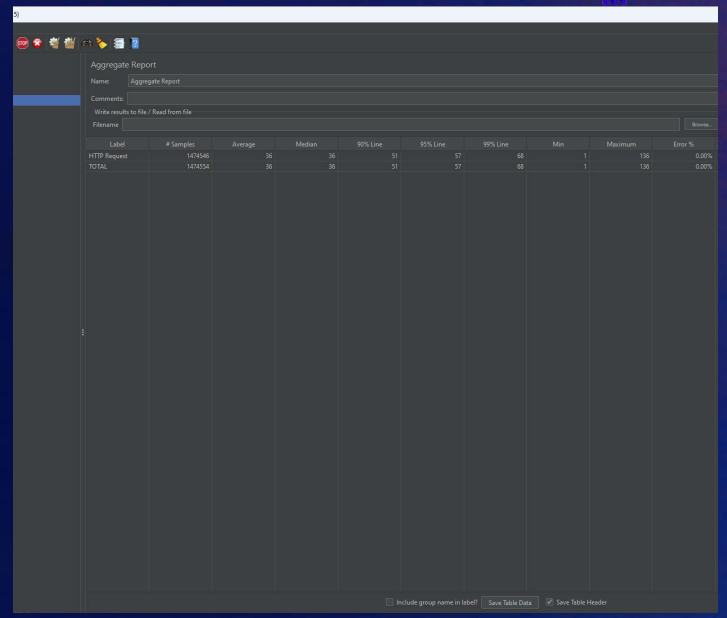
CPU 使用率

100%



TPS

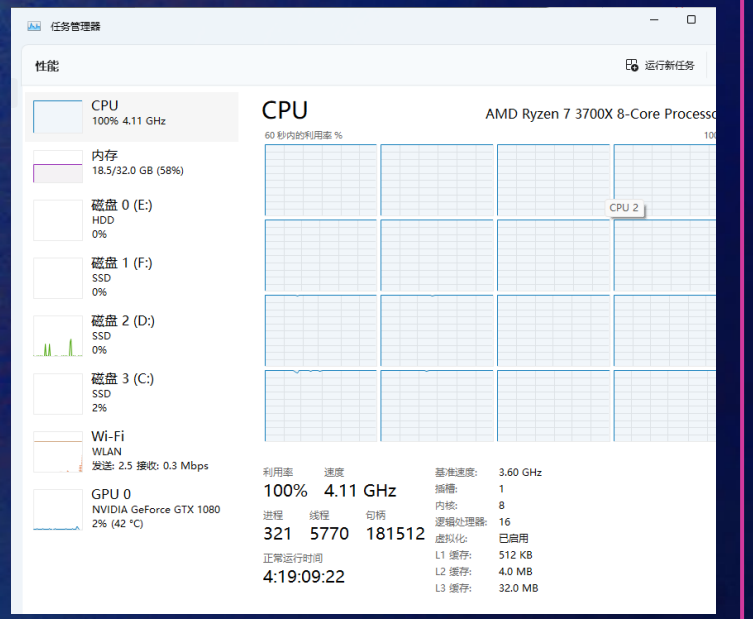
峰值：26000 Transactions per Second



响应时间

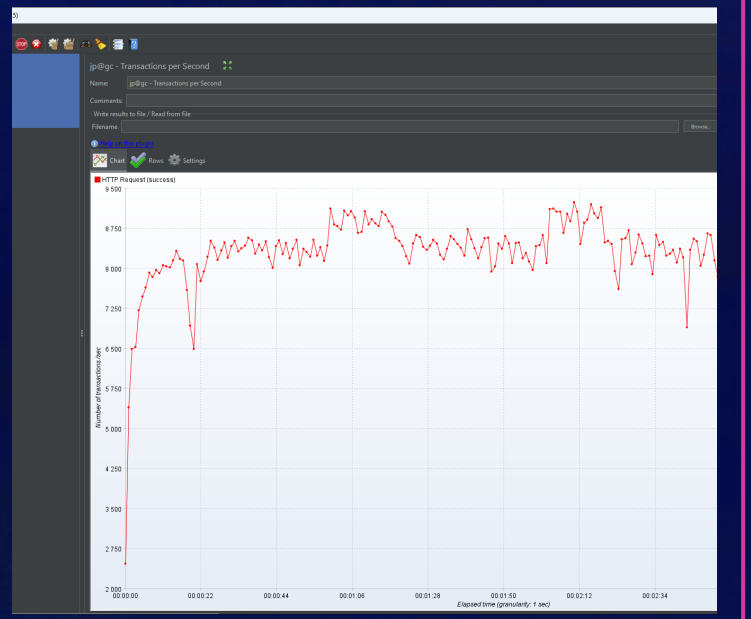
Min: 1 ms
Max: 136 ms
Average: 36 ms

nolimit-long-text



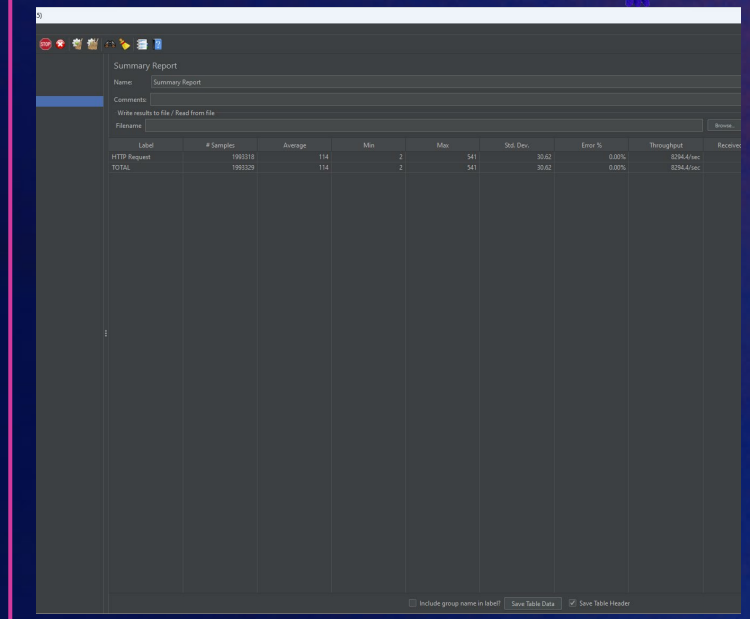
CPU 使用率

100%



TPS

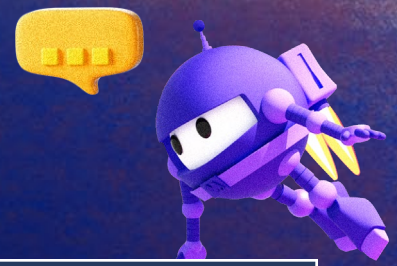
峰值: 9050 Transactions per Second



响应时间

Min: 2 ms
Max: 541 ms
Average: 114 ms

测试结果



用例	CPU	TPS	Min(ms)	Max(ms)	Avg(ms)
1C1G-short-text	55%	3600	1	518	264
1C1G-long-text	65%	3050	1	581	357
2C1G-short-text	84%	8000	1	284	132
2C1G-long-text	92%	7600	1	462	156
nolimit-short-text	100%	26000	1	136	36
nolimit-long-text	100%	9050	2	541	114

扩展性

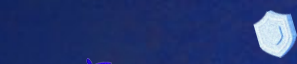
Configuration Files
Configuration Providers
Configuration Filters
Direct Forwarding
HTTP client configuration
HTTPS & TLS
Header Guidelines
Header Routing
Authentication and Authorization
Cross-Origin Requests (CORS)
Session Affinity
Load Balancing

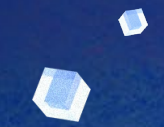
Middleware
Transforms
Destinations Health Checks
Distributed Tracing
gRPC
WebSockets and SPDY
Service Fabric Integration
Http.sys Delegation
Diagnosing proxy issues
A/B Testing
HTTP/3
Lets Encrypt

关键扩展点

Configuration Providers	LoadBalancingPolicy	TransformFactory	Middleware
• Configuration Files • InMemory • Ingress Resource	• FirstAlphabetical • Random • PowerOfTwoChoices • RoundRobin • LeastRequests	• Path* • Query*Parameter • HttpMethodChange • RequestHeader* • X-Forwarded	• Any Middleware

什么时候要打造自己的 Ingress Controller?





场景

单体架构向服务化架构演进时

系统运行环境向k8s迁移时

期望在系统网关上做个性化扩展时

自定义 Ingress Controller vs Nginx Ingress Controller

- 基于 .NET，有效利用团队能力
- 相较于Nginx具备更灵活的扩展能力
- Ingress Controller 即网关，更短的调用链路
- 基于Ingress Resource 的路由配置，无需额外服务注册发现中间件

如何打造自己的 Ingress Controller

打造自定义 Ingress Controller

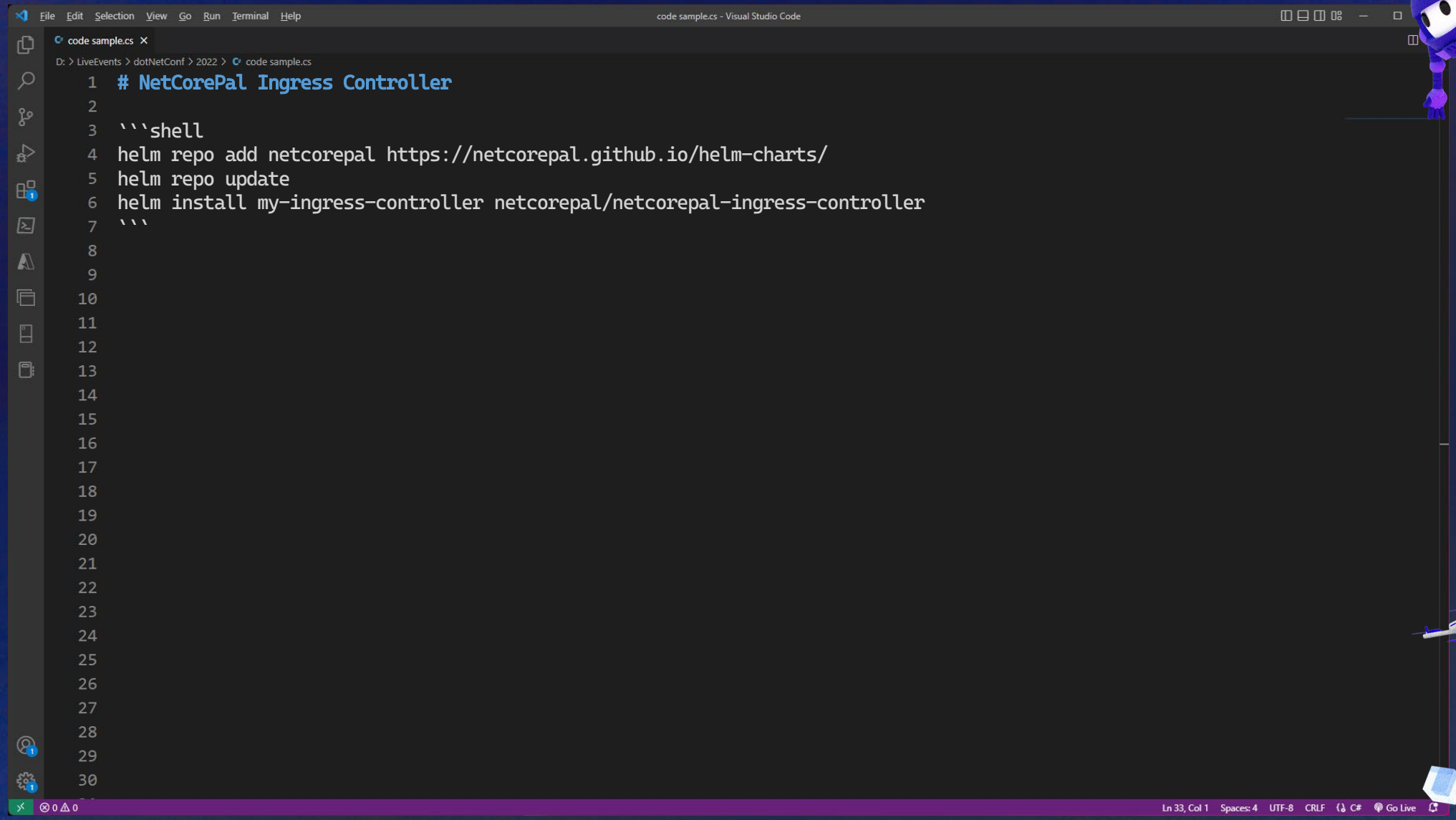
官方样例

NetCorePal
Helm Charts

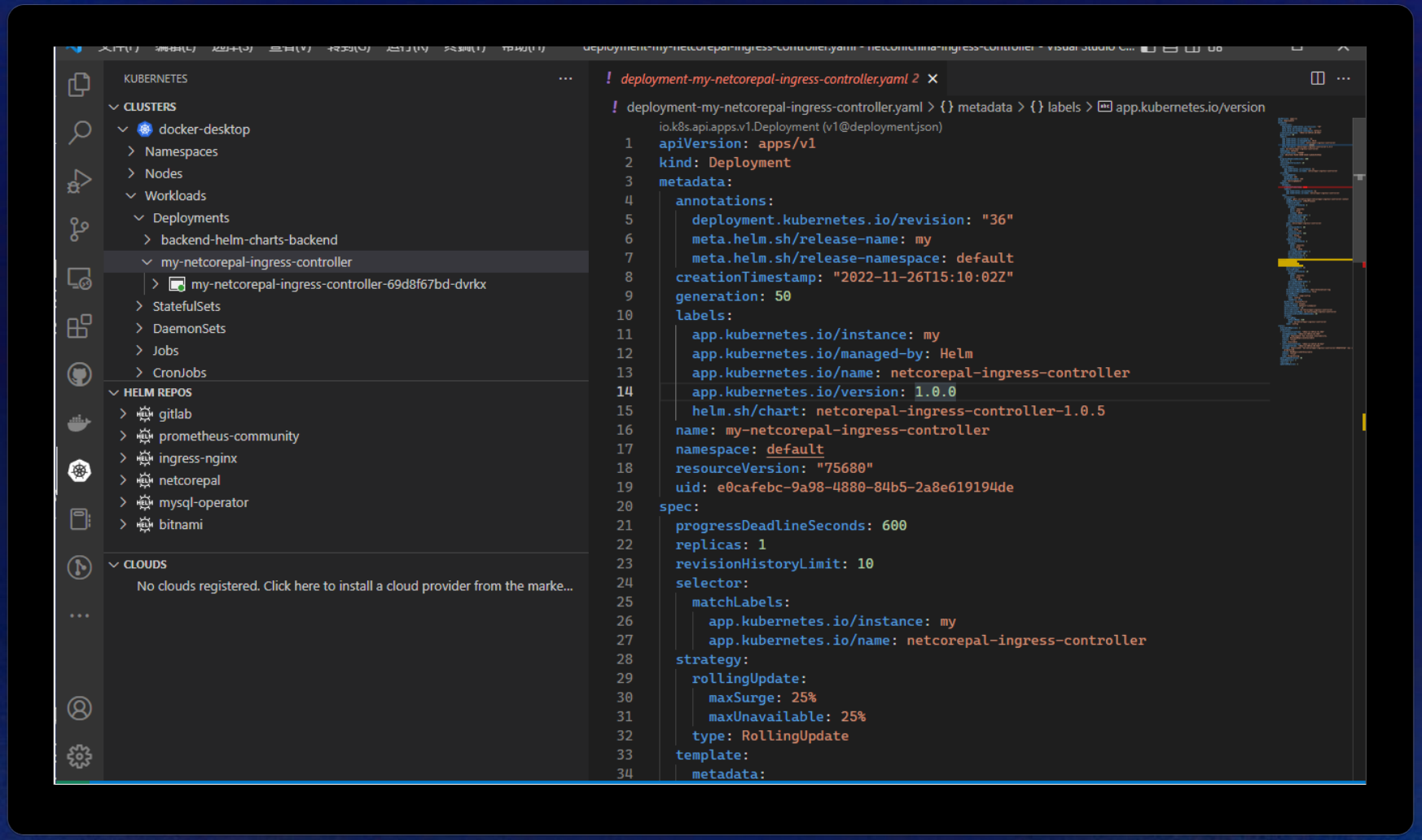
NetCorePal
YARP Template

helm repo add netcorepal https://netcorepal.github.io/helm-charts/ helm repo update helm install my-ingress-controller netcorepal/netcorepal-ingress-controller

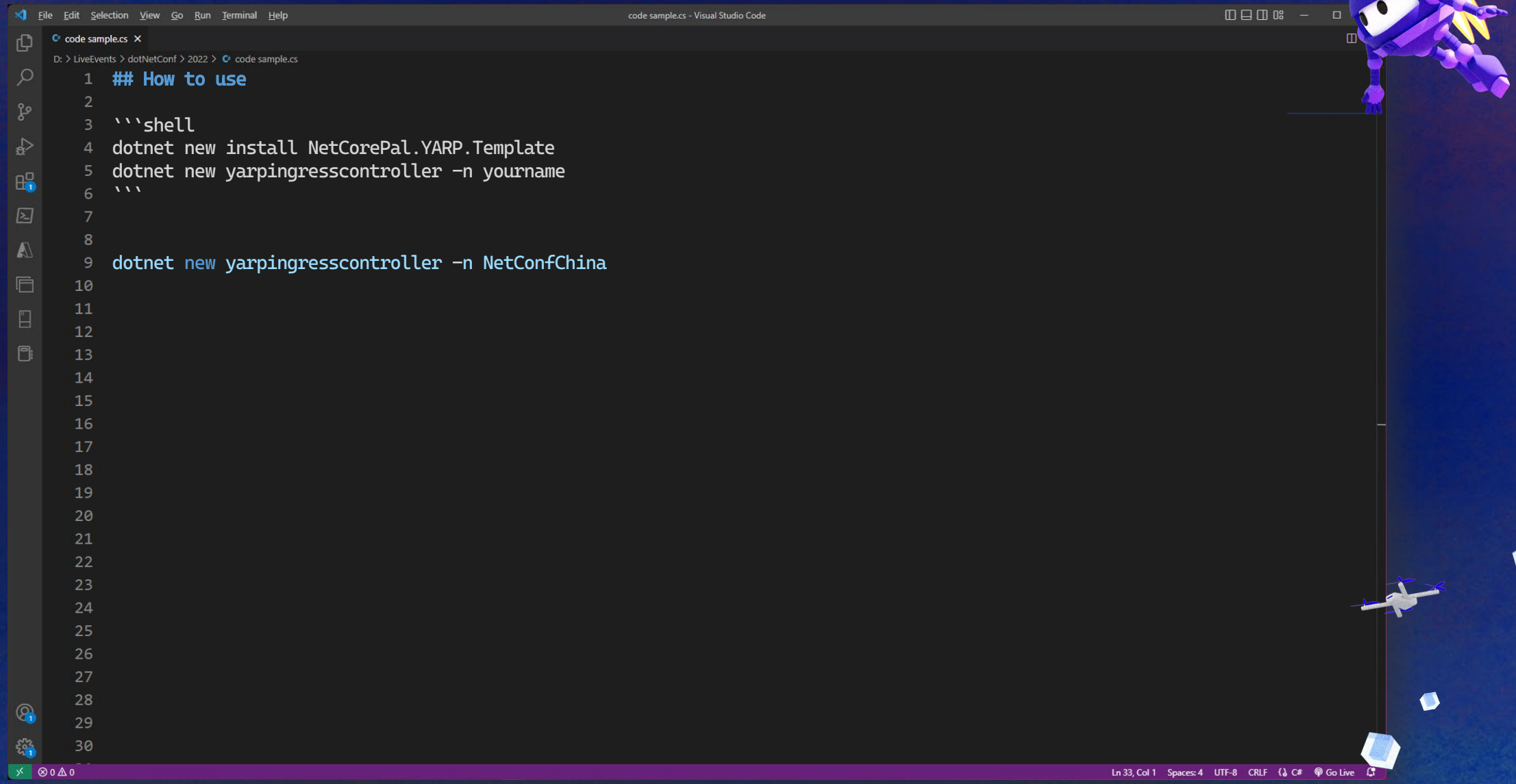
NetCorePal Helm Charts



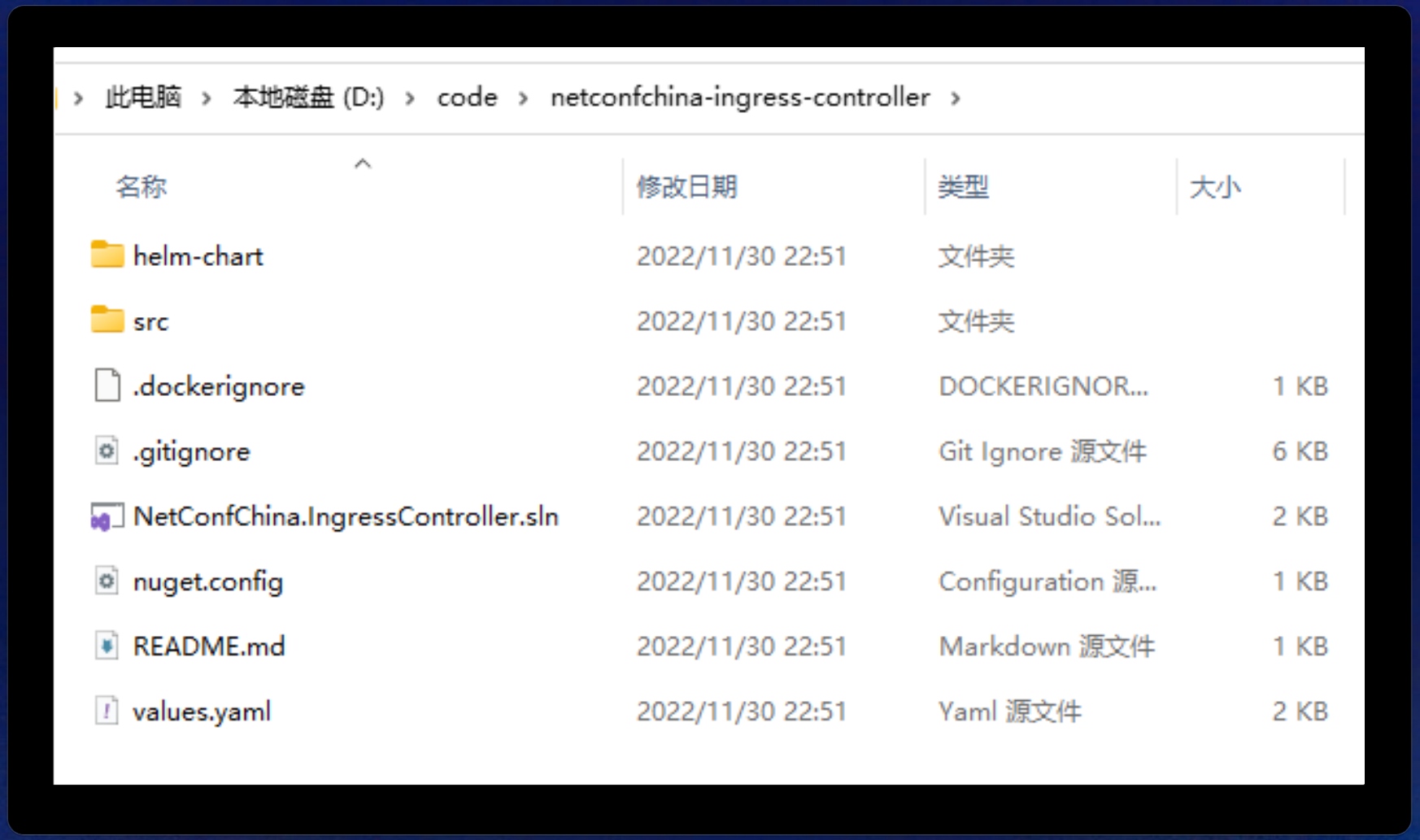
NetCorePal Helm Charts 部署效果



NetCorePal YARP Template

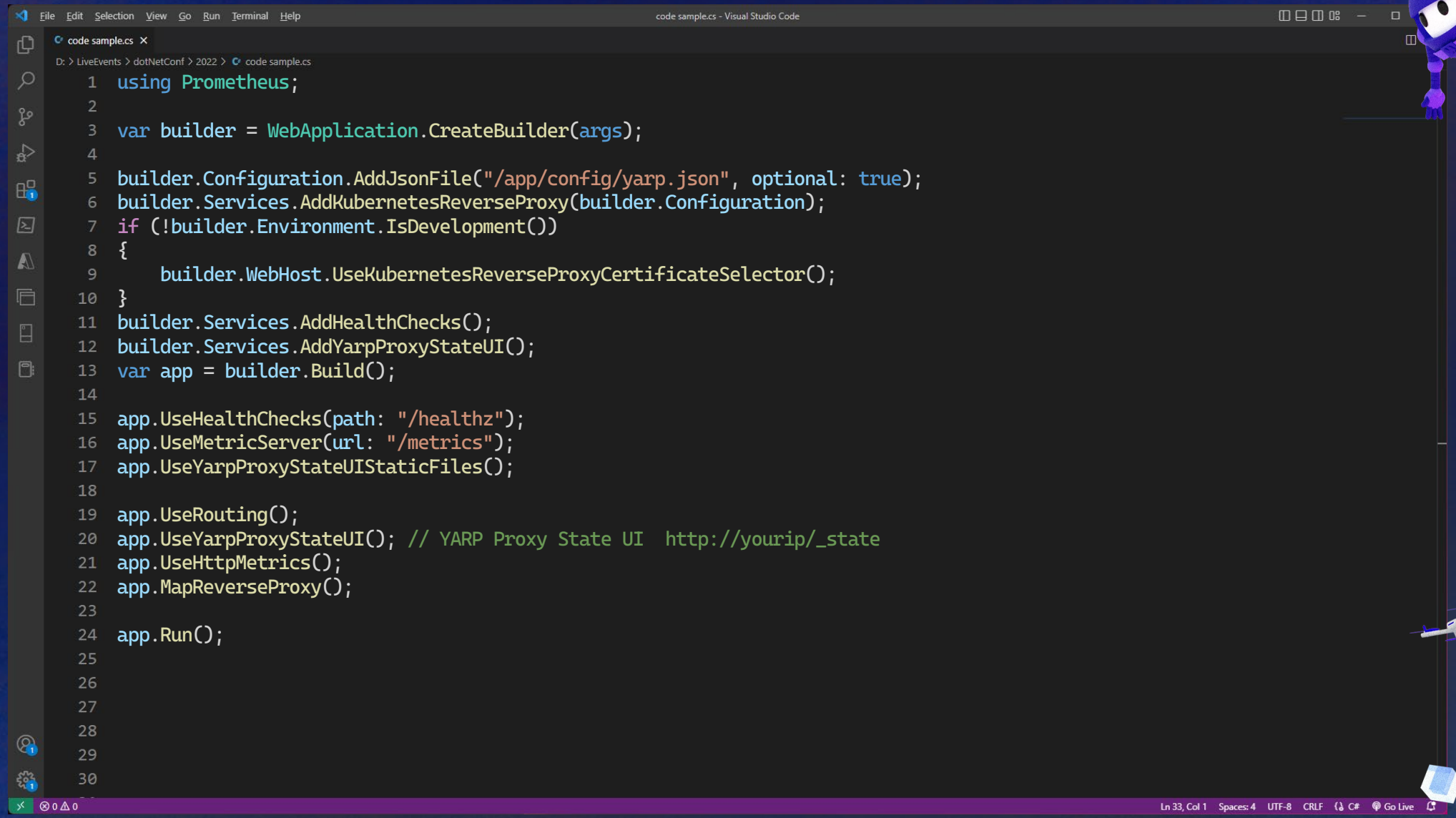


工程目录


此电脑 › 本地磁盘 (D:) › code › netconfchina-ingress-controller ›
名称
修改日期
类型
大小
helm-chart 2022/11/30 22:51 文件夹
src 2022/11/30 22:51 文件夹
.dockerignore 2022/11/30 22:51 DOCKERIGNOR... 1 KB
.gitignore 2022/11/30 22:51 Git Ignore 源文件 6 KB
NetConfChina.IngressController.sln 2022/11/30 22:51 Visual Studio Sol... 2 KB
nuget.config 2022/11/30 22:51 Configuration 源... 1 KB
README.md 2022/11/30 22:51 Markdown 源文件 1 KB
values.yaml 2022/11/30 22:51 Yaml 源文件 2 KB

dotnet new install NetCorePal.YARP.Template dotnet new yarpingresscontroller -n yourname
dotnet new install NetCorePal.YARP.Template dotnet new yarpingresscontroller -n yourname
dotnet new install NetCorePal.YARP.Template dotnet new yarpingresscontroller -n yourname

Program.cs




```
using Prometheus;

var builder = WebApplication.CreateBuilder(args);

builder.Configuration.AddJsonFile("/app/config/yarp.json", optional: true);
builder.Services.AddKubernetesReverseProxy(builder.Configuration);
if (!builder.Environment.IsDevelopment())
{
    builder.WebHost.UseKubernetesReverseProxyCertificateSelector();
}
builder.Services.AddHealthChecks();
builder.Services.AddYarpProxyStateUI();
var app = builder.Build();

app.UseHealthChecks(path: "/healthz");
app.UseMetricServer(url: "/metrics");
app.UseYarpProxyStateUIStaticFiles();

app.UseRouting();
app.UseYarpProxyStateUI(); // YARP Proxy State UI  http://yourip/_state
app.UseHttpMetrics();
app.MapReverseProxy();

app.Run();
```

dotnet new install NetCorePal.YARP.Template dotnet new yarpingresscontroller -n yourname
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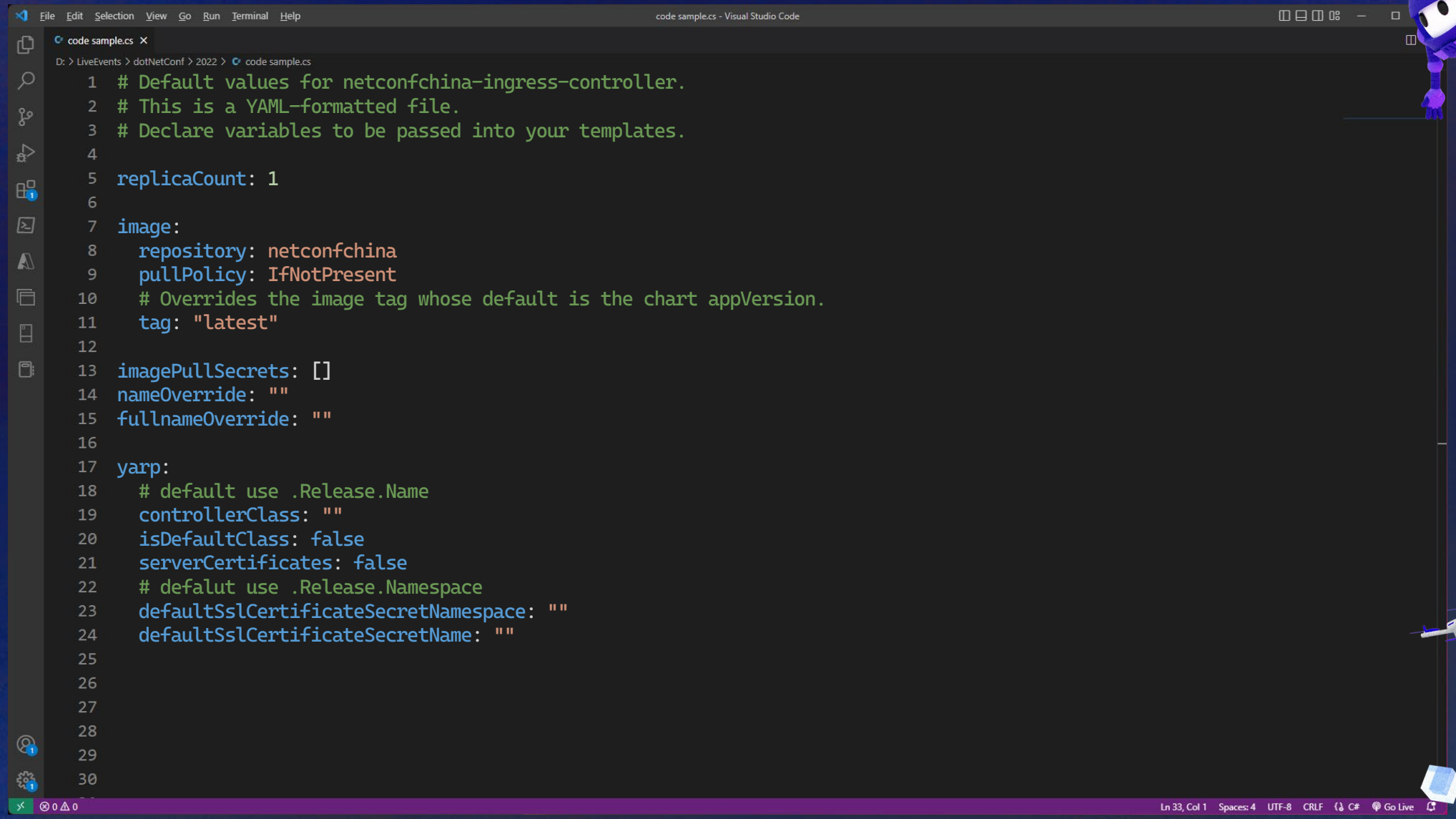
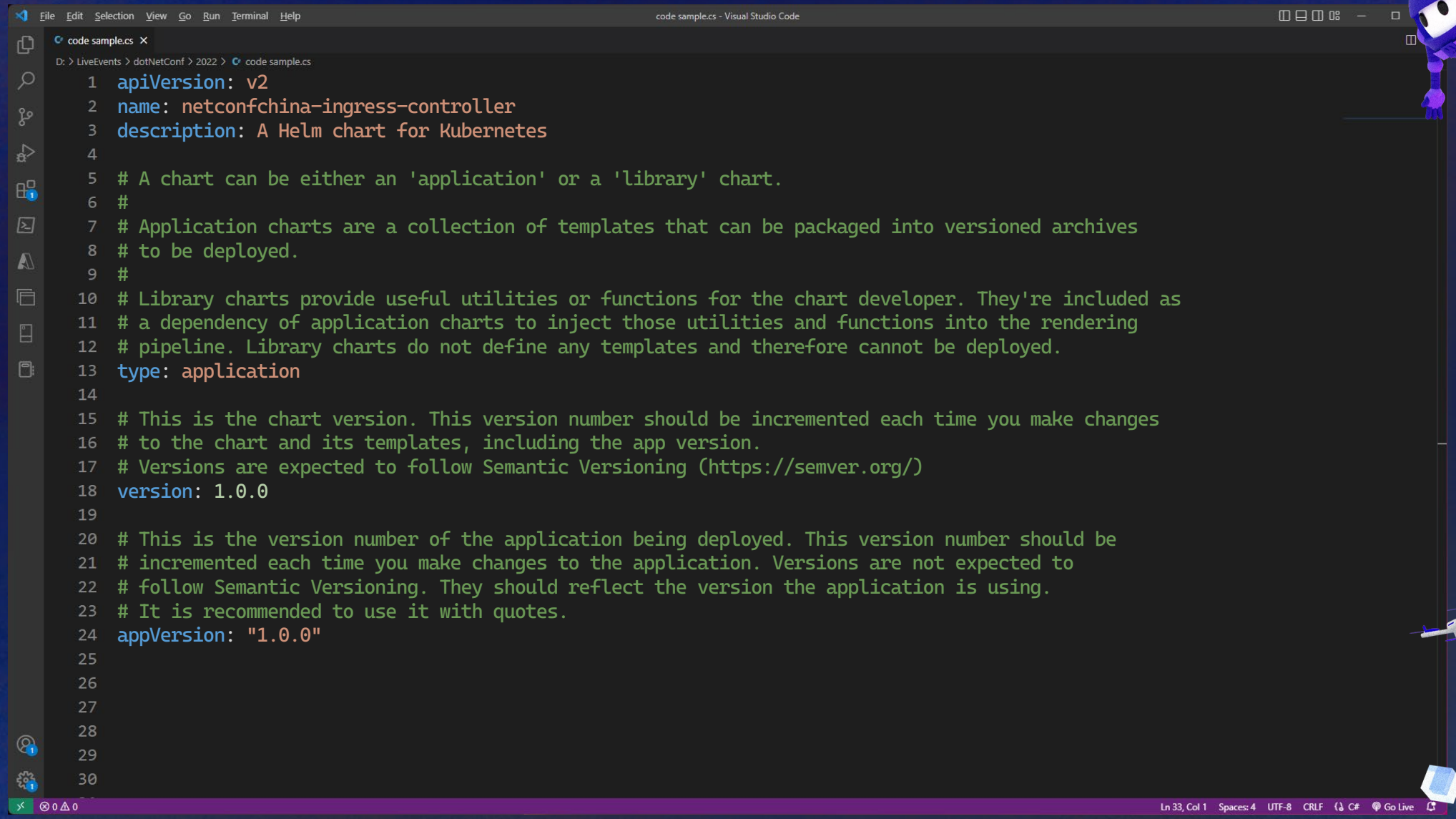
dotnet new install NetCorePal.YARP.Template dotnet new yarpingresscontroller -n yourname

values.yaml



dotnet new install NetCorePal.YARP.Template dotnet new yarpingresscontroller -n yourname
dotnet new install NetCorePal.YARP.Template dotnet new yarpingresscontroller -n yourname
dotnet new install NetCorePal.YARP.Template dotnet new yarpingresscontroller -n yourname

Chart.yaml



相关资料

相关资料

YARP GitHub: https://github.com/microsoft/reverse-proxy

Docs: https://microsoft.github.io/reverse-proxy/articles/getting-started.html

NetCorePal Ingress Controller: https://github.com/netcorepal/netcorepal-ingress-controller

NetCorePal Helm Charts：https://github.com/netcorepal/helm-charts

NetCorePal YARP Template: https://github.com/netcorepal/netcorepal-yarp-template

Preformance Testing: https://github.com/netcorepal/yarp-preformance-testing

Thank you!

Wechat: xiaoweiyu2020