

Implementacja i testy skalowalności systemu wideokonferencyjnego

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Wdrożenie Jitsi

Konfiguracja Jitsi

jitsi-values.yaml

```
1  publicURL: "jitsi.google.sex.pl"
2
3  jvb:
4    useHostPort: true
5    stunServers: 'turn:158.101.210.198:3478?transport=tcp,turn:158.101.210.198:3478?transport=udp'
6    publicIPs:
7      - '158.101.210.198'
8    service:
9      enabled: true
10   type: ClusterIP
11   externalTrafficPolicy: ""
12
13 prosody:
14   transcriber:
15     enabled: false
16   extraEnvFrom: |
17     - secretRef:
18       name: jitsi-turn-secret
19
20 web:
21   extraEnvsFrom:
22     - secretRef:
23       name: jitsi-turn-secret
```

Uruchomienie Jitsi

turn-secret.yaml

```
1  apiVersion: v1
2  kind: Secret
3  metadata:
4    name: jitsi-turn-secret
5  type: Opaque
6  stringData:
7    TURN_CREDENTIALS: "abcdefghijklmnopqrstuvwxyz012345"
8    TURN_HOST: "158.101.210.198"
9    TURN_PORT: "3478"
1 # postawienie samego jitsi
```

```
2
3  kubectl apply -f turn-secret.yaml
```

```
4  helm install myjitsi jitsi/jitsi-meet --values values.yaml
```

Udostępnienie Jitsi bez publicznego adresu IP

Pangolin - Tworzenie zdalnego dostępu

The screenshot shows the 'Create Site' page in the Pangolin web interface. On the left, a sidebar lists various organization management options like Server Admin, GENERAL, ACCESS CONTROL, and ORGANIZATION. The main area is titled 'Create Site' and contains several sections:

- Site Information:** Fields for 'Name' (K8s) and 'Site Address' (100.90.128.4). A note specifies the IP must be within the organization's subnet.
- Tunnel Type:** Options include 'Newt Tunnel (Recommended)' (selected), 'Basic WireGuard', and 'Local'.
- Newt Credentials:** Details how Newt will authenticate with the server. It includes fields for 'Newt Endpoint' (https://pangolin.google.sex.pl), 'Newt ID' (abcdefgijklmn), and 'Newt Secret Key' (abcdefghijklmnopqrstuvwxyz0123456789abcdefgijkl).
- Save Your Credentials:** A note stating you will only be able to see this once and should copy it to a secure place.
- Buy Supporter Key:** An orange button.
- Community Edition:** Version v1.1.1 information.
- Install Newt:** A link at the bottom.

Pangolin - Uruchomienie zdalnego dostępu

newt-cred.env

```
1 PANGOLIN_ENDPOINT=https://pangolin.google.sex.pl
2 NEWT_ID=abcdefghijklmnop
3 NEWT_SECRET=abcdefghijklmnopqrstuvwxyz0123456789abcdefghijklmn
4
```

values-newt.yaml

```
1 newtInstances:
2   - name: main
3     enabled: true
4     auth:
5       existingSecretName: newt-cred
6       keys:
7         endpointKey: PANGOLIN_ENDPOINT
8         idKey: NEWT_ID
9         secretKey: NEWT_SECRET
10
11 # dodanie repo
12
13 helm repo add fossalrial https://charts.fossalrial.io
```

Pangolin - Zdalny Dostęp

Manage Sites

Allow connectivity to your network through secure tunnels

Manage Sites								
Name	Online	Site	Data In	Data Out	Connection Type	Exit Node	Address	
Local	● Online	lorem-ipsum-dolor	21.37 GB	21.37 GB	Newt	Exit Node /f9o+o2	1.2.3.4	... <button>Edit →</button>
Local-No-Newt	-	sit-amet-consectetur	-	-	Local	-	5.6.7.8	... <button>Edit →</button>
K8s	● Online	adipiscing-elit-donec	21.37 GB	21.37 GB	Newt v1.5.0	Exit Node /f9o+o2	9.10.11.12	... <button>Edit →</button>
TrueNAS	● Online	blandit-turpis-nulla	21.37 GB	21.37 GB	Newt v1.5.2	Exit Node /f9o+o2	13.14.15.16	... <button>Edit →</button>

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Pangolin - Tworzenie Zasobu

Create Resource

Follow the steps below to create a new resource

[See All Resources](#)

Resource Information

Name

This is the display name for the resource.

Resource Type

Determine how you want to access your resource

HTTPS Resource

Proxy requests to your app over HTTPS using a subdomain or base domain.

Raw TCP/UDP Resource

Proxy requests to your app over TCP/UDP using a port number. This only works when sites are connected to nodes.

HTTPS Settings

Configure how your resource will be accessed over HTTPS

Subdomain

Base Domain



Targets Configuration

Set up targets to route traffic to your backend services

Address

TrueNAS http :// myjitsi-jitsi-meet-web.default.svc.cluster.local

: 80

Unknown

Health Check

Enabled



Delete

Pangolin - SSL + Wyłączenie SSO

Jitsi Settings

Configure the settings on your resource

Authentication

Not Protected

URL

<https://jitsi.google.sex.pl>

Visibility

Enabled

General

Proxy

Authentication

Rules

Users & Roles

Configure which users and roles can visit this resource

Use Platform SSO

Save Users & Roles



Set up targets to route traffic to your backend services

Address

MH-K8s



http

::/

myjitsi-jitsi-meet-web.default.svc.cluster.local

: 80

+ Add Target

Additional Proxy Settings

Configure how your resource handles proxy settings

Tailscale - Czemu wyłączyć SSO?

A screenshot of a web browser window titled "Auth - Pangolin". The address bar shows "pangolin.google.sex.pl/auth/login". The main content is a dark-themed login form for "PANGOLIN". The form includes fields for "Email" and "Password", a "Forgot your password?" link, a large orange "Log in" button, and a "Continue with security key" option. Below the form, it says "OR CONTINUE WITH" and "Authentik". At the bottom, it asks "Don't have an account? [Sign up](#)". The browser interface includes standard navigation buttons, a search bar, and a toolbar with various icons.

PANGOLIN

Log in to get started

Email

Password

Forgot your password?

Log in

Continue with security key

OR CONTINUE WITH

Authentik

Don't have an account? [Sign up](#)

Tailscale - Pliki konfiguracyjne

tailscale-secret.yaml

```
1  apiVersion: v1
2  kind: Secret
3  metadata:
4    name: tailscale-auth
5  stringData:
6    TS_AUTHKEY: tskey-auth-abcdefghijklmnopq-rstuvwxyz1234567890abcdefghijklmn
```

Tailscale - pliki konfiguracyjne cz. 2

```
tailscale-rbac.yaml
1  apiVersion: v1
2  kind: ServiceAccount
3  metadata:
4    name: tailscale
5
6  —
7
8  apiVersion: rbac.authorization.k8s.io/v1
9  kind: Role
10 metadata:
11   name: tailscale
12 rules:
13   - apiGroups: []
14     resourceNames: ["tailscale-auth"]
15     resources: ["secrets"]
16     verbs: ["get", "update", "patch"]
17
18  —
19
20 apiVersion: rbac.authorization.k8s.io/v1
21 kind: RoleBinding
22 metadata:
23   name: tailscale
24 subjects:
25   - kind: ServiceAccount
26     name: tailscale
27 roleRef:
28   kind: Role
```

Tailscale - Pliki konfiguracyjne cz. 3

tailscale-proxy.yaml

```
1  apiVersion: v1
2  kind: Pod
3  metadata:
4      name: tailscale-proxy
5  spec:
6      serviceAccountName: tailscale
7      initContainers:
8          - name: sysctler
9              image: busybox:latest
10             securityContext:
11                 privileged: true
12             command: ["/bin/sh"]
13             args:
14                 - -c
15                 - sysctl -w net.ipv4.ip_forward=1 net.ipv6.conf.all.forwarding=1
16      containers:
17          - name: tailscale
18              image: ghcr.io/tailscale/tailscale:latest
19              env:
20                  - name: TS_KUBE_SECRET
21                      value: tailscale-auth
22                  - name: TS_AUTHKEY
23                      valueFrom:
24                          secretKeyRef:
25                              name: tailscale-auth
26                              key: TS_AUTHKEY
27                  - name: TS_USERSPACE
28                      value: "false"
29                  - name: TS_DEST_IP
30                      value: 10.108.40.240
31              securityContext:
32                  privileged: true
```

Tailscale - Dlaczego Takie IP?

```
root@jitsi-1:/home/student/tailscale# kubectl get services
NAME           TYPE      CLUSTER-IP   EXTERNAL-IP   PORT(S)          AGE
kubernetes     ClusterIP 10.96.0.1    <none>        443/TCP         26d
myjitsi-jitsi-meet-jvb   ClusterIP 10.108.40.240  <none>        10000/UDP       31h
myjitsi-jitsi-meet-jvb-metrics ClusterIP 10.108.15.188 <none>        9888/TCP       31h
myjitsi-jitsi-meet-web    ClusterIP 10.106.197.43  <none>        80/TCP          31h
myjitsi-prosody      ClusterIP 10.108.213.244 <none>        5280/TCP,5281/TCP,5347/TCP,5222/TCP,5269/TCP 31h
root@jitsi-1:/home/student/tailscale# |
```

Tailscale - uruchomienie

```
19 # dodanie repo
20
21 helm repo add tailscale https://pkgs.tailscale.com/helmcharts
22 helm repo update
23
24 # postawienie tailscale
25
26 kubectl apply -f tailscale-secret.yaml
27 kubectl apply -f tailscale-rbac.yaml
28 kubectl apply -f tailscale-proxy.yaml
```

Tailscale - Przekierowanie z VPS

MACHINE	ADDRESSES ⓘ	VERSION	LAST SEEN	...
tailscale-proxy	100.105.219.104 ⓘ	1.90.9 Linux 6.12.48+deb13-amd64	Connected	

```
30  # routing w iptables
31
32  iptables -t nat -A PREROUTING -p udp --dport 10000 -j DNAT --to-destination 100.105.219.104:10000
33  iptables -t nat -A POSTROUTING -j MASQUERADE
...
```

TURN - konfiguracja

⚙ turnserver.conf

```
1 realm=google.sex.pl
2 external-ip=158.101.210.198
3 fingerprint
4 lt-cred-mech
5
6 static-auth-secret=abcdefghijklmnopqrstuvwxyz012345
```

TURN - docker-compose

docke docker-compose.yaml

▷Run All Services

```
1 services:
2   coturn:
3     image: coturn/coturn:4.6.3      # pin to the current stable tag
4     container_name: coturn
5     restart: unless-stopped
6     ports:
7       # STUN/TURN
8       - "3478:3478"
9       - "3478:3478/udp"
10      # TLS-TURN
11      - "5349:5349"
12      - "5349:5349/udp"
13      # RTP/RTCP relays (adjust range if you need fewer ports)
14      - "49000-49020:49000-49020/udp"
15
16     environment:
17       # Secure long-term credentials (generate once; keep secret)
18       STATIC_AUTH_SECRET: "${TURN_STATIC_AUTH_SECRET}"
19       EXTERNAL_IP: "158.101.210.198"
20
21     volumes:
22       # Bind your custom conf + persistent database & logs
23       - "/gdzie/tylko/chcesz/coturn/turnserver.conf:/etc/coturn/turnserver.conf:ro"
24       - "coturn-data:/var/lib/coturn"
25       - "coturn-logs:/var/log"
26
27     # Use host networking if you prefer not to publish individual ports
28     # network_mode: "host"
29
30   volumes:
31     coturn_data:
```

Efekt - Działające (nierożproszone) Jitsi

The screenshot shows a Jitsi video conference interface. On the left, there's a sidebar with a 'Chat' section containing messages from users 'popple' and 'Chryba' at 14:29, and 'test' and 'dziadek' at 14:29. Below that is an 'Everyone' section. At the bottom, there's a message input field with placeholder 'Type a message...' and a red send button. The main area shows a video feed of a participant with their face blurred. To the right of the video is a developer tools console window titled 'Elements' with the URL 'http://localhost:4321'. The console displays several log entries in JSON format, primarily from the 'jitsi' and 'RTC' namespaces, detailing video encoding statistics and quality controller operations.

```
2025-11-08T13:29:39.452Z [DEBUG] [qc:QualityController]
<Du__processOutboundRtpStats>: Encode stats for localTrack[2, time=17, 565121412#0#3517, resolution=720, qualityLimitationReason=<anonymous>>; Compute pressure state changed: [{"source": "cpu", "state": "nominal", "ownContributionEstimate": 0.2080000002}]

2025-11-08T13:29:39.944Z [INFO] [rtc:BridgeChannel] <e.onmess
SenderSourceConstraints: b8a1810c-v0 - 360
2025-11-08T13:29:39.944Z [DEBUG] [qc:SendVideoController]
<Eu_onGenderConstraintsReceived>: Sender constraints for sour
maxHeight: 360
2025-11-08T13:29:39.944Z [INFO] [xmpp:JingleSessionPC]
<11 setSenderVideoConstraint>
JingleSessionPC[session=JVB, initiator=false, sid=54a1guq45s1lb]
360, sourceName: b8a1810c-v0
2025-11-08T13:29:39.945Z [INFO] [rtc:TraceablePeerConnection]
<b4_updateVideoSenderEncodings>
maxHeight=360, encodings=[{"active": true, "adaptivePrime": false,
"clockRate": 90000, "mimeType": "video/AV1", "sdpFingerprint": "level
idx=5;profile=0;tier=0"}, {"maxBitrate": 300000, "networkPriority"
"bilityMode": "LIT3 KEY", "scaleResolutionBy": 2}, {"targetBitrate": 150000, "w
"clockRate": 90000, "mimeType": "video/AV1", "sdpFingerprint": "level
idx=5;profile=0;tier=0"}, {"maxBitrate": 8, "networkPriority": "low
"active": false, "adaptivePrime": false, "codec": "code
"clockRate": 90000, "mimeType": "video/AV1", "sdpFingerprint": "level
idx=5;profile=0;tier=0"}, {"maxBitrate": 8, "networkPriority": "low
2025-11-08T13:29:40.223Z [DEBUG] [rtc:BridgeChannel] <e.onmess
Connection stats: bwe=18656000 bps
2025-11-08T13:29:40.442Z [DEBUG] [qc:QualityController]
<Du__processOutboundRtpStats>: Encode stats for localTrack[2, time=17, 32511210762332, resolution=360, qualityLimitationReason=<anonymous>>; Compute pressure state changed: [{"source": "cpu", "state": "nominal", "ownContributionEstimate": 0.30800000075}]

2025-11-08T13:29:40.451Z [DEBUG] [qc:QualityController]
<Du__processOutboundRtpStats>: Encode stats for localTrack[2, time=5, 671052631578959, resolution=360, qualityLimitationReason=<anonymous>>; Compute pressure state changed: [{"source": "cpu", "state": "nominal", "ownContributionEstimate": 0.30800000075}]
```

Skalowanie jvb

Co zostało dodane do values.yaml?

- Aby przeskalać jvb, następujące wartości zostały dodane:

jvb:

```
## Set JVB instance count:  
replicaCount: 2  
## Expose JVB interface port to the outside world  
# only on nodes that actually have it:  
useHostPort: true  
## Make every JVB pod announce its Node's external  
# IP address and nothing more:  
useNodeIP: true
```

octo:

```
## Enable OCTO support for both JVB and Jicofo:  
enabled: true
```

OCTO - co to?

- OCTO to mechanizm multi-bridge routing, który pozwala rozproszyć uczestników jednego spotkania między wiele instancji Jitsi Videobridge (jvb).
- Bez OCTO każde spotkanie musi być obsługiwane przez jeden jvb; gdy osiągnie limit CPU/bitrate - jakość spada.
- Z OCTO spotkanie może używać kilku jvb jednocześnie.

Przed skalowaniem jvb

```
Context: kubernetes-admin@kubernetes [RW]
Cluster: kubernetes
User: kubernetes-admin
K9s Rev: v0.50.16
K8s Rev: v1.32.9
CPU: n/a
MEM: n/a

          <0> all      <a>     Attach
          <1> monitoring <ctrl-d> Delete
          <2> default    <d>     Describe
          <e>     Edit
          <?>     Help
          <shift-j> Jump Owner
```



pods(default)[4]							
NAME	PF	READY	STATUS	RESTARTS	IP	NODE	AGE
myjitsi-jitsi-meet-jicofo-6fff848dfc-hf5d8	●	1/1	Running	0	10.2.161.95	jitsi-2	5d21h
myjitsi-jitsi-meet-jvb-5f599db5c8-74t8z	●	2/2	Running	0	10.2.161.86	jitsi-2	5d21h
myjitsi-jitsi-meet-web-86c6d94bf-bxmr4	●	1/1	Running	0	10.2.161.69	jitsi-2	5d21h
myjitsi-prosody-0	●	1/1	Running	0	10.2.161.107	jitsi-2	2d16h

Po skalowaniu jvb

```
Context: kubernetes-admin@kubernetes [RW]
Cluster: kubernetes
User:   kubernetes-admin
K9s Rev: v0.50.16
K8s Rev: v1.32.9
CPU:    n/a
MEM:    n/a
```

pods (default) [6]							
Name	PF	Ready	Status	Restarts	IP	Node	Age
myjitsi-jitsi-meet-jicofo-d4978ffdb-w2nkn	●	1/1	Running	0	10.2.161.105	jitsi-2	22h
myjitsi-jitsi-meet-jvb-778dfb5469-c74sx	●	2/2	Running	0	10.2.161.75	jitsi-2	22h
myjitsi-jitsi-meet-jvb-778dfb5469-ghklw	●	2/2	Running	0	10.2.63.188	jitsi-3	22h
myjitsi-jitsi-meet-web-86c6d94bf-82fsp	●	1/1	Running	0	10.2.161.68	jitsi-2	22h
myjitsi-prosody-0	●	1/1	Running	0	10.2.63.190	jitsi-3	22h
tailscale-proxy	●	1/1	Running	0	10.2.161.79	jitsi-2	22h

Jak to wygląda w logach jicofo

```
Jicco 2025-11-29 11:49:50.513 FINER: [279] [rome:bjabberme@internal-muc_meet.jitsi-meet -7778fbdf5469-gihw] <priority=><priority><stats xmlns='http://jitsi.org/protocol/calibri'><stat name='incoming_loss' value='0.0'/><stat name='outgoing_loss' value='0.0'/><stat name='overall_loss' value='0.0'/><stat name='endpoint_with_high_outgoing_loss' value='0.0'/><stat name='local_active_endpoints' value='0.0'/><stat name='rtt_aggregate' value='0.0'/><stat name='num_eps_overstreaming' value='0.0'/><stat name='octo_conferences' value='0.0'/><stat name='p2p_conferences' value='0.0'/><stat name='endpoints' value='0.0'/><stat name='participants' value='0.0'/><stat name='receive_only_endpoints' value='0.0'/><stat name='inactive_endpoints' value='0.0'/><stat name='octo_endpoints' value='0.0'/><stat name='endpoints_sending_audio' value='0.0'/><stat name='endpoints_send_ng_video' value='0.0'/><stat name='largest_conference' value='0.0'/><stat name='octo_receive_bitrate' value='0.0'/><stat name='octo_receive_packet_rate' value='0.0'/><stat name='octo_send_bitrate' value='0.0'/><stat name='octo_send_packet_rate' value='0.0'/><stat name='total_participants' value='0.0'/><stat name='total_relays' value='0.0'/><stat name='total_visitors' value='0.0'/><stat name='num_eps_no_mg_transfer_after_delay' value='0.0'/><stat name='total_keyframes_received' value='0.0'/><stat name='total_layering_changes_received' value='0.0'/><stat name='total_video_stream_milliseconds_received' value='0.0'/><stat name='stress_level' value='0.0118899927679409'/><stat name='conferences' value='0.0'/><stat name='visitors' value='0.0'/><stat name='local_endpoints' value='0.0'/><stat name='total_data_channel_messages_received' value='115'/><stat name='total_data_channel_messages_sent' value='109'/><stat name='total_colibri_web_socket_messages_received' value='0.0'/><stat name='total_colibri_web_socket_messages_sent' value='0.0'/><stat name='total_packets_received' value='26824'/><stat name='total_packets_sent' value='1025'/><stat name='total_bytes_received_octo' value='61984'/><stat name='total_bytes_sent_octo' value='2793987'/><stat name='total_packets_received_octo' value='0.0'/><stat name='total_packets_sent_octo' value='0.0'/><stat name='total_icc_sucessed' value='12'/><stat name='preemptive_kfp_sent_value' value='0.0'/><stat name='preemptive_kfp_suppressed_value' value='0.0'/><stat name='average_participant_stress' value='0.01'/><stat name='current_stress' value='0.012971171297112971'/><stat name='endpoints_disconnected' value='0.0'/><stat name='clients_configured' value='1'/><stat name='clients_joined' value='0.0'/><stat name='clients_connected' value='1'/><stat name='endpoints_reconnected' value='0.0'/><stat name='version' value='2.3.25-p22880ff7d'/><stat name='region' value='all'/><stat name='cx' value='https://jabber.org/protocol/caps hash=sha-1' nodes='https://igniterealmtime.org/projects/smack' vers='V78g0Dz1OpFgmEd0tm/amy4w+><capcupid id='valnsm:xmp:occupant_id' value='YbDq1lqn1296+022nn586+Nqr=q0xRlmP2k8/><capcupid id='x' value='https://jabber.org/protocol/mucUser'><item affiliation='owner' jid='jib@beuth.mt.jitsi/H4mYFV1lBil' role='moderator' x='165' y='33' z='1'></presence>
```

```
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```

Przetestowanie skalowania

Szybkie przypomnienie

- Master Node - maszyna której rolą jest zarządzanie Kubernetes
- Worker Node - maszyna której rolą jest trzymać aplikacje (w podach) użytkownika

Kubernetes

Co się okazuje:

- Master nie obsługuje ruchu użytkowników.
- Master nie uruchamia Podów aplikacyjnych.
- Master nie streamuje danych, nie przetwarza requestów HTTP, nie robi downloadów/uploadów.

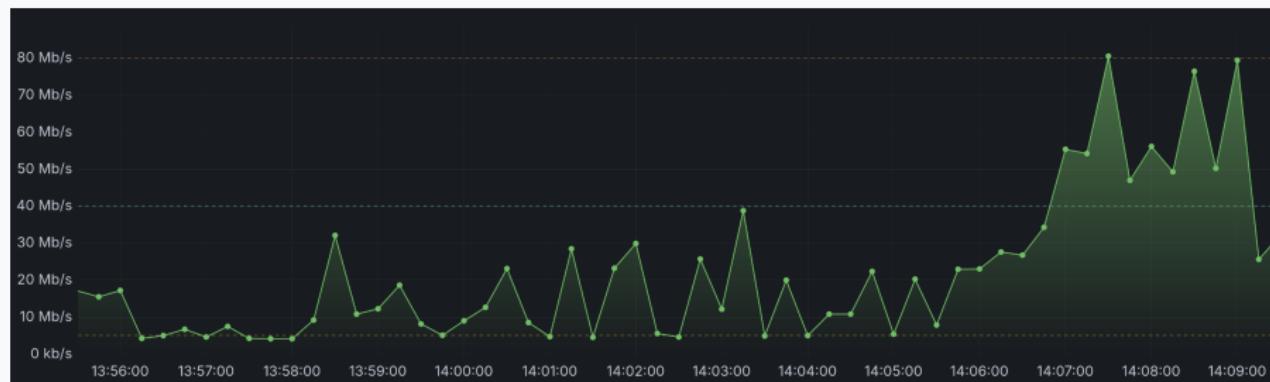
Kubernetes 2

Nawet jeśli master ma wolny internet (np. 1 Mbps), nie wpływa to na:

- prędkość odpowiedzi aplikacji,
- throughput,
- czas obsługi zapytań HTTP/Websocket/GRPC,
- szybkość pobierania danych przez aplikację.

Kubernetes 3

To w trakcie stress testowania jitsi, gdy master ma 128kbit/s:



Czemu nie użyliśmy narzędzi zewnętrznych

Webrtcperf dla jitsi jest całkowicie zepsute.

No to teraz jak przetestować jitsi...

Jitsi bardzo dobrze się skaluje. Według oficjalnych pomiarów:

- Dla 1056 strumieni wideo z bitrate 550mbit/s zużycie CPU to tylko 20% przy czterordzeniowym procesorze.
- Dla 1056 strumieni wideo Zużycie RAMu nie przekroczyło 1.5GB

Czemu tak się dzieje?

Jitsi Videobridge jest tylko przekaźnikiem, bez żadnego transkodowania.
Nie tworzy skomplikowanych reguł, ani nie weryfikuje nic.

Działa trochę jak router.

Demo

Dziękujemy za uwagę