

 Hello, **Conference!**_

Контейнеризация программных решений Open RAN

Артем Лошаков
Руководитель проектов
направления развития
Open RAN

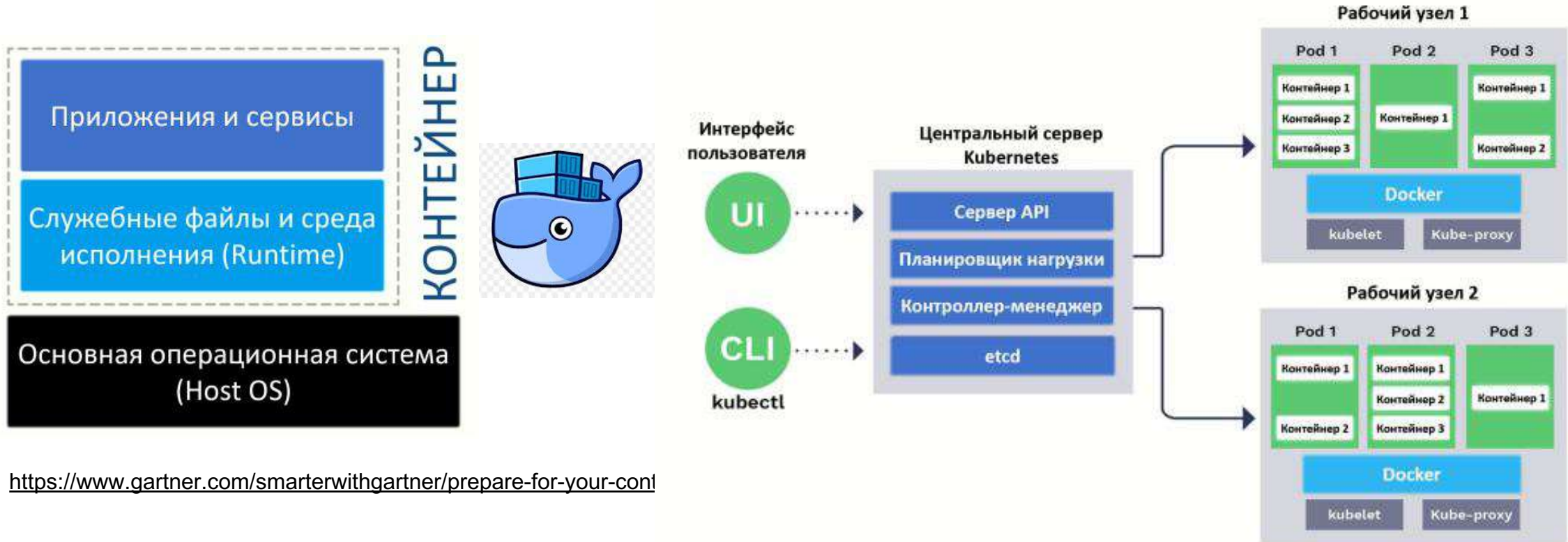
22 сентября 2020



КОНТЕЙНЕРИЗАЦИЯ

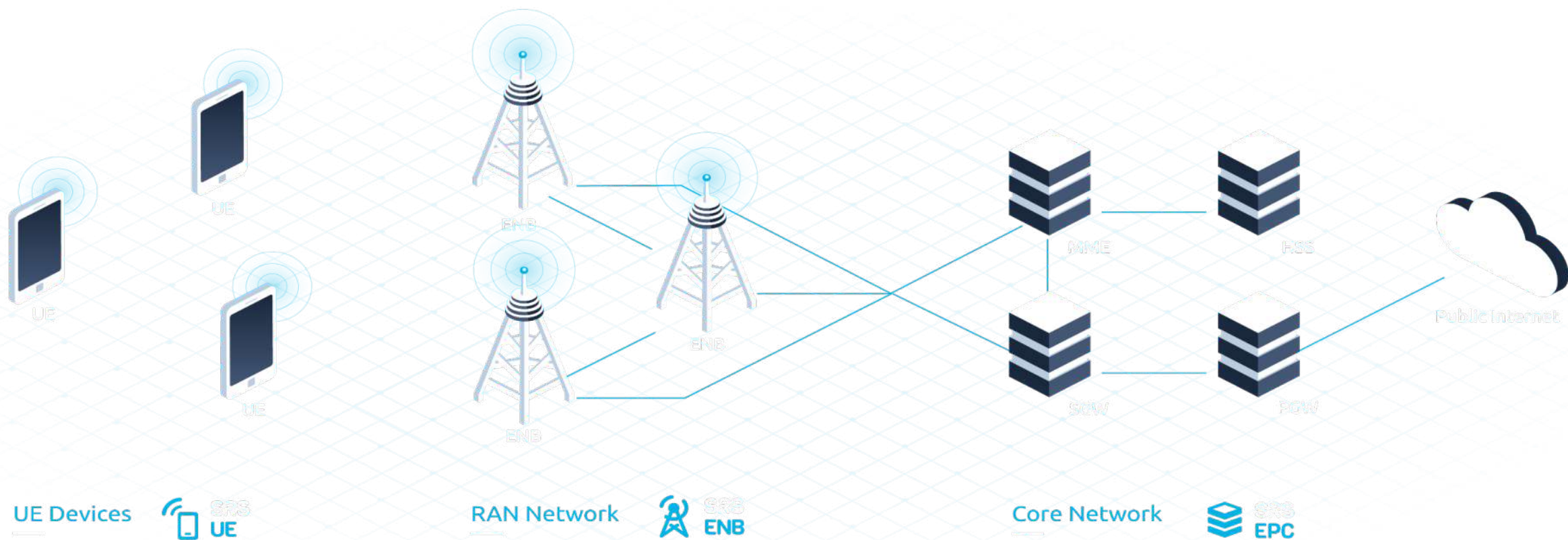
Самое весомое преимущество контейнеризации — ускорение разработки и выпуска приложений

Gartner predicts- in 2022 more than 75% global organizations will be running containerized applications in production. Now - <30%



<https://www.gartner.com/smarterwithgartner/prepare-for-your-cont>

ДЕМОНСТРАЦИЯ КОНТЕЙНЕРИЗАЦИИ ПРОТОТИПА БАЗОВОЙ СТАНЦИИ НА БАЗЕ ОТКРЫТОГО ПО SRSLTE



<https://www.srslte.com/>

ДЕМОНСТРАЦИЯ ОПЫТА УПАКОВКИ ПРИЛОЖЕНИЯ SRSLTE В КОНТЕЙНЕР И ЗАПУСК В СРЕДЕ KUBERNETES

Исходный код srsLTE

<https://github.com/srsLTE/srsLTE>

srsLTE - Your own mobile... | srsLTE/srsLTE: Open source... | srslte / docker - GitLab... | master [srslte-docker] [Jeni... | Harbor... | srslte / deploy / helm-chart...

← → ↻ 🏠

https://github.com/srsLTE/srsLTE

srsLTE / srsLTE

<> Code 32 Issues 3 Pull requests 3 Actions Projects Wiki Security Insights

master 4 branches 23 tags

Go to file Add file Code

alvasMan and suttonpd Small compilation fixes for GCC 10.1 #02bFe2 23 days ago 5,762 commits

| | | |
|---------------------|--|---------------|
| 📁 .github | gh_actions: enable gcc and clang builds, disable parallel ctest for x86 | 4 months ago |
| 📁 cmake/modules | add 20.04.1 changelog and bump version | 4 months ago |
| 📁 debian | Added script to help with the packaging | 12 months ago |
| 📁 lib | Small compilation fixes for GCC 10.1 | 23 days ago |
| 📁 srsenb | - Fix missing static tag in add_library, that could cause linker issu... | 23 days ago |
| 📁 srsepc | Fix for 1480090. | 4 months ago |
| 📁 srsue | Fix for 1489462. | 4 months ago |
| 📁 test | fix run_lte.sh for new ZMQ arguments | 4 months ago |
| 📄 .clang-format | wrote nas fsm test | 5 months ago |
| 📄 .clang-tidy | added for-range loop and bool decay checks to clang-tidy. Applied som... | 10 months ago |
| 📄 .lgtm.yml | add basic lgtm config | 9 months ago |
| 📄 .travis.yml | travis: add missing and optional build dependencies | 4 months ago |
| 📄 CHANGELOG | add 20.04.1 changelog and bump version | 4 months ago |
| 📄 CMakeLists.txt | Fix SIMD neg operation which was inverted. | 4 months ago |
| 📄 COPYRIGHT | Updating notices | 4 years ago |
| 📄 CTestConfig.cmake | let valgrind fail when test app returns 0 but valgrind still found an... | 2 years ago |
| 📄 CTestCustom.cmake | enable valgrind for test | 8 months ago |

СБОРКА DOCKER ОБРАЗА - ОСНОВНЫЕ ЧАСТИ И ФУНКЦИОНАЛ

The screenshot shows the GitLab web interface for the 'docker' repository. The left sidebar contains navigation options: Project overview, Repository (selected), Files, Commits, Branches, Tags, Contributors, Graph, Compare, Issues (0), Merge Requests (0), CI / CD, Operations, Analytics, Wiki, Snippets, and Settings. The main content area shows the repository structure for the 'docker' branch. A merge commit is visible: 'Merge branch 'hotfix/2207030-fix-debugging-tools'' by Rafis Ganeev, authored 1 month ago. Below this, a table lists the files in the repository:

| Name | Last commit |
|-------------|---|
| docker | Replace netcat with ncat |
| Jenkinsfile | Remove only master branch build (cherry picked from commit 9a851701d4e4b0...) |
| pom.xml | Release 1.0.3 |

СБОРКА НА JENKINS В АВТОМАТИЧЕСКОМ РЕЖИМЕ

The screenshot displays the Jenkins web interface for a job named 'srslte-docker/job/master'. The page is titled 'Pipeline master' and shows the full project name as 'srslte-docker/master'. It includes a sidebar with navigation options like 'Up', 'Status', 'Changes', 'Build Now', 'View Configuration', 'Full Stage View', 'Job Config History', 'Maven', 'Embeddable Build Status', and 'Pipeline Syntax'. The main content area features a 'Last Successful Artifacts' section with a link to 'srslte-1.0.3.pom' (5.75 KB) and a 'Recent Changes' section. Below this is a 'Stage View' section with a table showing average stage times: 'Declarative: Checkout SCM' (939ms) and 'Build' (5s). The 'Average full run time' is approximately 7s. A 'Permalinks' section lists links for the last build, last stable build, last successful build, and last completed build, all dated '1 mo 20 days ago'. At the bottom, there is a search bar with the text 'srs' and a search button.

https://jenkins.ngenie.mtsit.com/job/srslte-docker/job/master/lastSuccessfulBuild/artifact/ru/org/srslte/srslte/1.0.3/srslte-1.0.3.pom

srs

СОЗДАНИЕ HELM-CHART – АВТОМАТИЧЕСКИ РАЗВОРАЧИВАЕТ ТРИ ПРИЛОЖЕНИЯ SRSENB, SRSEPC, SRSUE

The screenshot shows the GitLab interface for a repository named 'helm-chart'. The left sidebar contains navigation options: Project overview, Details (selected), Activity, Releases, Repository, Issues (0), Merge Requests (1), CI / CD, Operations, Analytics, Wiki, Snippets, and Settings. The main content area displays the repository details, including the project name 'helm-chart', Project ID 6656, 40 Commits, 3 Branches, 0 Tags, and 1.1 MB Files. A 'Smarty 100.0%' badge is visible. Below this, there is an 'Auto DevOps' section with an 'Enable in settings' button. A commit history section shows a recent merge of branch 'feature/2253502-srsite-autodeploy' into 'master' by Konstantin Nifanin. At the bottom, there is a table listing files and their last commit messages.

| Name | Last commit |
|---------------|-------------------------|
| manifests-old | Fix image name |
| srsite | Fix image name |
| Jenkinsfile | Fix image name |
| README.md | Allow templates in args |

**AUTO DEVOPS :
ДЕПЛОЙМЕНТ
ПРОИСХОДИТ
В АВТОМАТИЧЕСКОМ
РЕЖИМЕ ПО ИЗМЕНЕНИЮ
В КОДЕ ИЛИ НАЖА
«BUILD NOW»**

The screenshot shows the Jenkins web interface for a pipeline named 'srsite-deploy/master'. The browser tabs include 'srsLTE - Your own mobile n...', 'srsLTE/srsLTE: Open source', 'srsite / docker - GitLab', 'master [srsite-docker] [Jen...', 'Harbor', and 'srsite / deploy / helm-chart'. The URL is 'https://jenkins.ngenie.mtsit.com/view/srsLTE/job/srsite-deploy/job/master/'.

The Jenkins interface shows a sidebar with navigation options: Up, Status, Changes, Build Now, View Configuration, Full Stage View, Job Config History, Embeddable Build Status, and Pipeline Syntax. The main content area is titled 'Pipeline master' and shows the full project name 'srsite-deploy/master'. There is a 'Recent Changes' section with a notepad icon.

The 'Stage View' section displays a table of stage times:

| | Declarative: Checkout SCM | Deploy |
|--|---------------------------|--------|
| Average stage times: (Average full run time: ~3s) | 1s | 1s |
| Aug 27 15:29 No Changes | 481ms | 985ms |
| Aug 27 15:28 No Changes | 1s | 1s |

Below the stage view is a 'Permalinks' section with a list of links:

- [Last build \(#1\) 19 sec ago](#)
- [Last stable build \(#1\) 19 sec ago](#)
- [Last successful build \(#1\) 19 sec ago](#)
- [Last completed build \(#1\) 19 sec ago](#)

On the left, the 'Build History' section shows a search bar with 'find' and a list of builds:

| # | Time |
|----|----------------------|
| #2 | Aug 27, 2020 3:29 PM |
| #1 | Aug 27, 2020 3:26 PM |

At the bottom of the build history, there are links for 'Atom feed for all' and 'Atom feed for failures'.

ПРАВКИ В KUBERNETES ДЛЯ ЗАПУСКА ПРИЛОЖЕНИЙ. ВЗАИМОДЕЙСТВИЕ МЕЖДУ КОНТЕЙНЕРАМИ. НАСТРОЙКА SSTR НА КЛАСТЕРАХ KUBER. ДОБАВИЛИ ПРАВА ДЛЯ КОНТЕЙНЕРОВ



Dashboard / DevOps Space / srsLTE

2. Установка srsLTE

Created by Стрельников Дмитрий Валерьевич, last modified by Ганев Радис Николаевич on Aug 25, 2020

srsLTE состоит из трех компонентов, каждый из которых разворачивается в отдельном pod, но из одного образа (<http://git.ngenie.mtsit.com/srsite/docker>). Каждый под за...
<http://git.ngenie.mtsit.com/srsite/deploy/helm-chart/tree/master> (в разработке)

У srsLTE есть несколько специфических требований:

- Kubernetes должен поддерживать SCTP протокол. На данный момент он находится в альфе, по этому его нужно отдельно подключить через feature-gates. В частности строку `--feature-gates=SCTPSupport=true`
- Для pod srsenb требуются дополнительные права securityContext - SYS_NICE
- Pod srsepc требует проброса `/dev/net/tun`, а так же дополнительных прав securityContext: NET_ADMIN и SYS_NICE
- srsue требует те же права, что и srsepc

srsue и srsenb потребляют большое количество vCPU ресурсов, по этому их следует разносить по разным node, для этого использован механизм podAntiAffinity.

Write a comment...

Powered by Atlassian Confluence 7.3.2 - Report a bug - Atlassian News

ATLASSIAN

ПРОВЕРКА РАБОТЫ КОНТЕЙНЕРА SRSLTE-SRSEPC

```
0700ngenie-outside-dev-kbr-mst01.ngenie.mtsit.com - PuTTY
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte get pods
No resources found.
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte get pods
NAME                                READY   STATUS    RESTARTS   AGE
srslte-dev-srsenb-88bf6989-8bnhs    1/1     Running  0           8s
srslte-dev-srsepc-75c66bfd74-8vhcv  1/1     Running  0           8s
srslte-dev-srsue-857bbfdc64-nz6wt   1/1     Running  0           8s
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte get service
NAME                                TYPE           CLUSTER-IP      EXTERNAL-IP      PORT(S)              AGE
srslte-dev-srsenb                   ClusterIP      10.97.138.104   <none>           2000/TCP,2152/UDP    2m14s
srslte-dev-srsepc                   ClusterIP      10.109.34.144   <none>           36412/SCTP,2152/UDP  2m14s
srslte-dev-srsue                   ClusterIP      10.97.125.37    <none>           2001/TCP              2m14s
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte get pods
NAME                                READY   STATUS    RESTARTS   AGE
srslte-dev-srsenb-88bf6989-8bnhs    1/1     Running  0           2m45s
srslte-dev-srsepc-75c66bfd74-8vhcv  1/1     Running  0           2m45s
srslte-dev-srsue-857bbfdc64-nz6wt   1/1     Running  0           2m45s
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte get pods
```

ПРОВЕРКА РАБОТЫ КОНТЕЙНЕРА SRSLTE-SRSENB

```
0700@ngenie-outside-dev-kbr-mst01.ngenie.mtsit.com · PuTTY
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte get pods
No resources found.
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte get pods
NAME                                READY   STATUS    RESTARTS   AGE
srslte-dev-srsenb-88bf6989-8bnhs    1/1     Running   0           8s
srslte-dev-srsepc-75c66bfd74-8vhcv  1/1     Running   0           8s
srslte-dev-srsue-857bbfdc64-nz6wt   1/1     Running   0           8s
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte get service
NAME                                TYPE           CLUSTER-IP      EXTERNAL-IP      PORT(S)              AGE
srslte-dev-srsenb                   ClusterIP      10.97.138.104   <none>           2000/TCP,2152/UDP    2m14s
srslte-dev-srsepc                   ClusterIP      10.109.34.144   <none>           36412/SCTP,2152/UDP 2m14s
srslte-dev-srsue                   ClusterIP      10.97.125.37    <none>           2001/TCP             2m14s
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte get pods
NAME                                READY   STATUS    RESTARTS   AGE
srslte-dev-srsenb-88bf6989-8bnhs    1/1     Running   0           2m45s
srslte-dev-srsepc-75c66bfd74-8vhcv  1/1     Running   0           2m45s
srslte-dev-srsue-857bbfdc64-nz6wt   1/1     Running   0           2m45s
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte logs srslte-dev-srsepc-75c66bfd74-8vhcv | less
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte logs srslte-dev-srsepc-75c66bfd74-8vhcv | less
```

ПРОВЕРКА РАБОТЫ КОНТЕЙНЕРА SRSLTE-SRSUE

```
0700@ngenie-outside-dev-kbr-mst01.ngenie.mtsit.com - PuTTY
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte get pods
No resources found.
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte get pods
NAME                                READY   STATUS    RESTARTS   AGE
srslte-dev-srsenb-88bf6989-8bnhs    1/1     Running  0           8s
srslte-dev-srsepc-75c66bfd74-8vhcv  1/1     Running  0           8s
srslte-dev-srsue-857bbfdc64-nz6wt   1/1     Running  0           8s
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte get service
NAME                                TYPE          CLUSTER-IP      EXTERNAL-IP      PORT(S)          AGE
srslte-dev-srsenb                    ClusterIP     10.97.138.104   <none>           2000/TCP,2152/UDP 2m14s
srslte-dev-srsepc                    ClusterIP     10.109.34.144   <none>           36412/SCTP,2152/UDP 2m14s
srslte-dev-srsue                    ClusterIP     10.97.125.37    <none>           2001/TCP         2m14s
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte get pods
NAME                                READY   STATUS    RESTARTS   AGE
srslte-dev-srsenb-88bf6989-8bnhs    1/1     Running  0           2m45s
srslte-dev-srsepc-75c66bfd74-8vhcv  1/1     Running  0           2m45s
srslte-dev-srsue-857bbfdc64-nz6wt   1/1     Running  0           2m45s
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte logs srslte-dev-srsepc-75c66bfd74-8vhcv | less
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte logs srslte-dev-srsenb-88bf6989-8bnhs | less
[ksnifani@ngenie-outside-dev-kbr-mst01 ~]$ kubectl -n srslte logs srslte-dev-srsenb-88bf6989-8bnhs | less
```

РЕСУРСЫ

Docker

<https://www.docker.com/>

Kubernetes

<https://kubernetes.io/>

<https://ru.wikipedia.org/wiki/Kubernetes>

Ngenie Cloud - автоматизация процесса создания IT-решений.

Среда разработки, развертывания и исполнения приложений с микросервисной архитектурой и/или контейнеризацией в контуре МТС <https://ngenie.mts.ru/>

srsLTE open-source проект открытого программного радио RAN

- ✓ [srsLTE main page : https://www.srslte.com/](https://www.srslte.com/)
- ✓ <https://docs.srslte.com/en/latest/>
- ✓ [srsLTE GitHub: https://github.com/srsLTE/srsLTE](https://github.com/srsLTE/srsLTE)
- ✓ <https://www.softwareradiosystems.com/>

 Hello, Conference!_

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СПАСИБО!

MTC