



Podlodka TechLead Crew
11–24 октября

Модуль 1.
Проектируем с нуля

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Netcracker

Доклад: Проектируем APIs правильно





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7+ years of experience
Dev & Tech Lead on Cloud Billing Product



Биллинг? А при чем тут API?



- Гео-специфичный маркетинг
- Более 50 крупных операторов по всему миру
- Гибкость решения

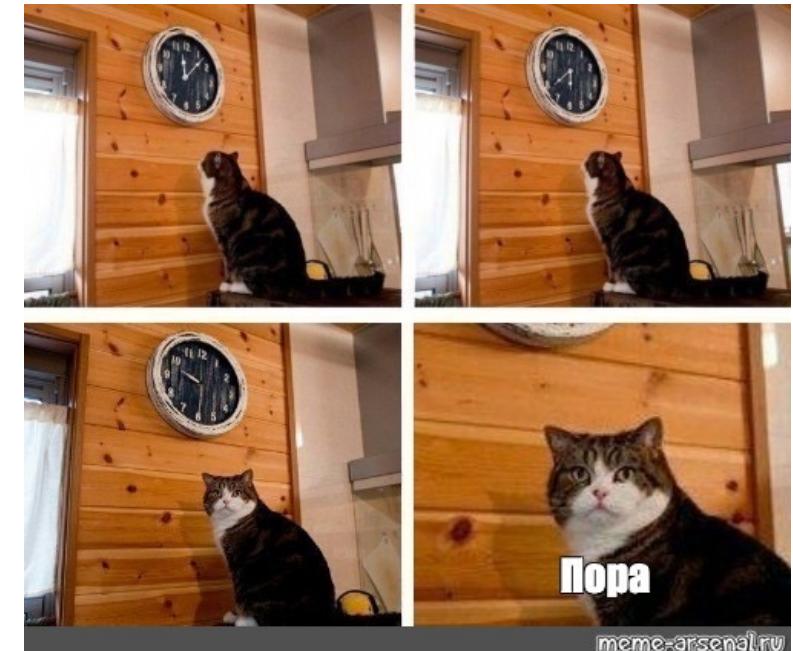
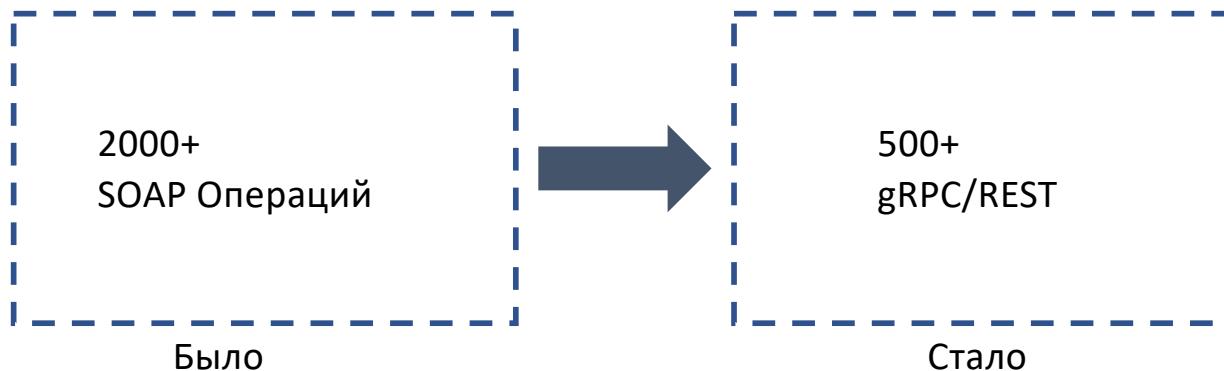


А что за API?

- Гигантская модель предметной области
 - >1500 таблиц в схеме БД
 - >2000 API операций
 - > 12М строк кода только в нашем биллинге
- Интеграции с внешними системами
- Возможность кастомизации для конкретных заказчиков

При Чем Тут Проектирование?

- Срок жизни продукта >10 лет
- Внешние интеграции



О чём мы поговорим?

1. С чего начать изменения
2. Документация
3. Гайдлайны
4. Ошибки
5. Версионирование
6. Забота о клиентах

1. Не Трогай Пока Не Понял!

- Составьте ваш список плюсов и минусов текущего решения
- Станьте пользователем системы
- Поговорите с текущими пользователями
- Уточните с экспертами непонятные части



1. Не Трогай Пока Не Понял!

- Почему тут такая сигнатура?
- Почему тут просто не апсерт?
- Зачем дублировать старое состояние?



POST /account Update Account

Updates account

Parameters

No parameters

Request body required

Update Account Request

Examples:

Update Account

Example Value | Schema

```
{  
  "old": {  
    "name": "Old Name",  
    "id": 42  
  },  
  "new": {  
    "name": "New Name",  
    "id": 42  
  }  
}
```

1. Не Трогай Пока Не Понял!

- Почему тут такая сигнатура?
- Почему тут просто не апсерт?
- Зачем дублировать старое состояние?



Это была Защита от race condition

POST /account Update Account

Updates account

Parameters

No parameters

Request body required

Update Account Request

Examples:

Update Account

Example Value | Schema

```
{  
  "old": {  
    "name": "Old Name",  
    "id": 42  
  },  
  "new": {  
    "name": "New Name",  
    "id": 42  
  }  
}
```

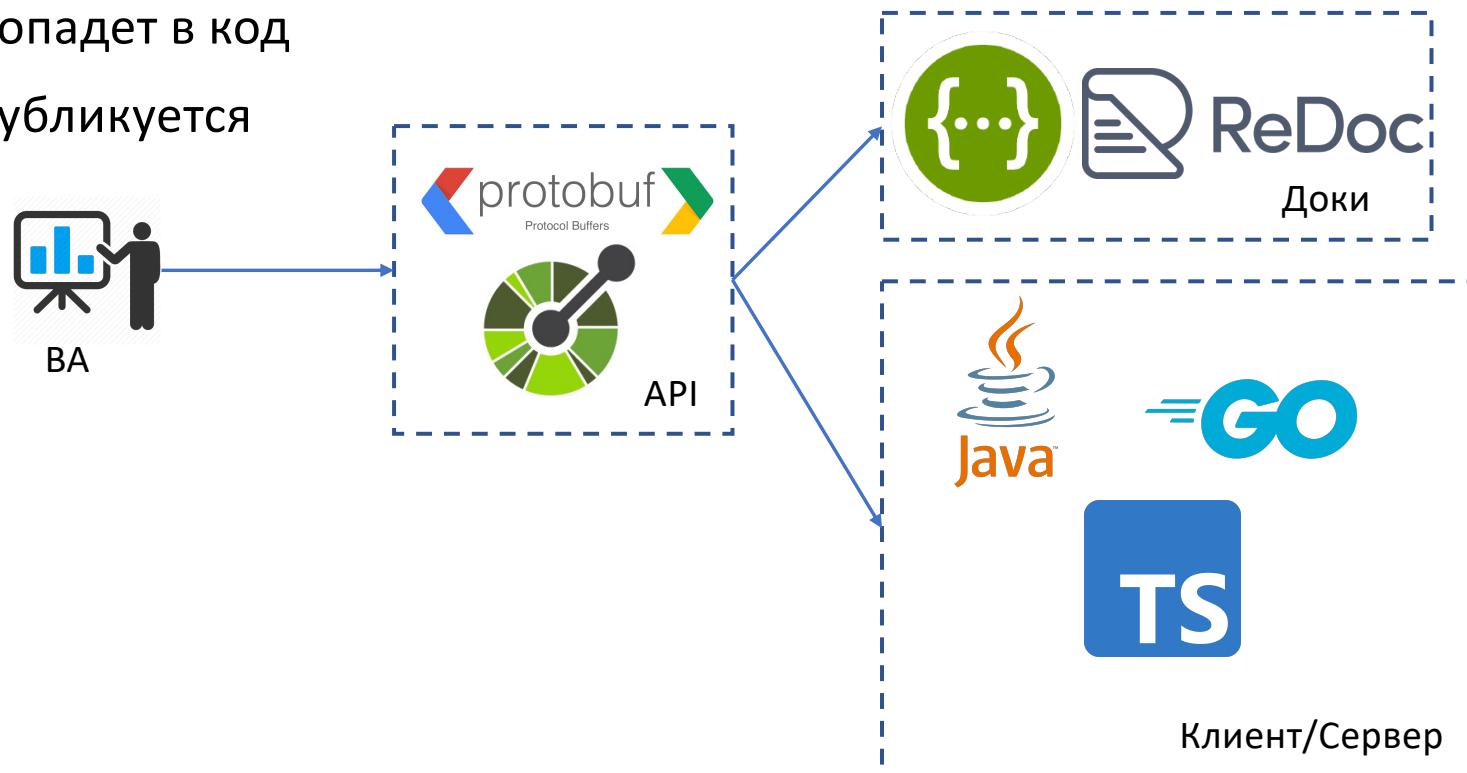
2. Продумайте Документацию!

- Документация обязательна
- Не должно быть сакральных знаний
- Настройте свои процессы



2. Продумайте Документацию!

- Документация пишется БА как часть спецификации
- Попадет в код
- Публикуется



```

// Create Account
//
// Method which creates account with its Sub-Resources
//
// ## Supported optional Children Sub-Resources
//      * Event Summaries
//
// Account would be active from the go live date provided and cannot be created
// in pending state( currently restricted).Status of account
// decides the behavior of account and its associated entities.
//
// Account should choose to be of balance forward or open item accounting
// method.
//
// Account should have an accounting currency along with tax status(Tax
// inclusive or tax exclusive) which decides the products and services
// available for the account. General billing information associated with
// account is used for billing the account.Bill details which are mandatory
// for an account are,billing driver, next bill date, bill period, bill period
// units. If account's customer is under customer driven billing, by default
// account inherits all billing details from customer. Account driven billing
// requires all the bill details for creation.
//
// Based on the bill style associated with the account,it becomes rating only
// account or regular account.
//
// Invoicing company is inherited from customer, if it is associated at
// customer,if not associated it is mandatory
// at account.
// Payment method must be from the list of payment methods available for
// invoicing company.
//
// Account's credit class association decides collection schedule for the
// account, the default credit limit for account which could be overridden at
// account level and payment due after a bill is generated
//
// Additionally configure custom attributes for accounts within your
// installation of Rating and Billing Manager. Account attributes provide
// support for customizations or for additional security or audit
// requirements.
//
// Child sub resources creation:
//
// Event Summary : Creates a new event summary for a given account
rpc CreateAccount(CreateAccountRequest) returns (model.Account) {

```

Protobuf спецификации конвертируются в OpenAPI 3.0

POST /accounts:create Create Account

Method which creates account with its Sub-Resources

Supported optional Children Sub-Resources

* Event Summaries

SYSautoAccountNumberingBool specifies whether unique account numbers are automatically generated or to be assigned by the user.

Account would be active from the go live date provided and cannot be created in pending state(currently restricted).Status of account decides the behavior of account and its associated entities.

Account should choose to be of balance forward or open item accounting method.

Account should have an accounting currency along with tax status(Tax inclusive or tax exclusive) which decides the products and services available for the account. General billing information associated with account is used for billing the account.Bill details which are mandatory for an account are,billing driver, next bill date, bill period, bill period units. If account's customer is under customer driven billing, by default account inherits all billing details from customer. Account driven billing requires all the bill details for creation.

Based on the bill style associated with the account,it becomes rating only account or regular account.

Invoicing company is inherited from customer, if it is associated at customer,if not associated it is mandatory at account. Payment method must be from the list of payment methods available for invoicing company.

Account's credit class association decides collection schedule for the account, the default credit limit for account which could be overridden at account level and payment due after a bill is generated

Additionally configure custom attributes for accounts within your installation of Rating and Billing Manager. Account attributes provide support for customizations or for additional security or audit requirements.

Child sub resources creation:

Event Summary : Creates a new event summary for a given account

Parameters

Try it out

- ReDoc предоставляет удобный инструмент для генерации документации
- Документация встроена в тех UI
- ReDoc отдельно публикуется как Static HTML

Create Account

Method which creates account with its Sub-Resources

Supported optional Children Sub-Resources

- Event Summaries

SYSautoAccountNumberingBool specifies whether unique account numbers are automatically generated or to be assigned by the user.

Account would be active from the go live date provided and cannot be created in pending state(currently restricted).Status of account decides the behavior of account and its associated entities.

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Additionally configure custom attributes for accounts within your installation of Rating and Billing Manager. Account attributes provide support for customizations or for additional security or audit requirements.

Child sub resources creation:

Event Summary : Creates a new event summary for a given account

Request samples

Payload

Content type
application/json

Example
account create with sub-resources

Create account with attributes and event summaries instance

Copy Expand all Collapse all

Response samples

200

Content type
application/json

account create with sub-resources response

Copy Expand all Collapse all

```
{}
```

2. Продумайте Документацию!

- Вся документация попадает в код
- Все прозрачно для девелоперов и интеграторов

```
a.CreateAccount()  
Unhandled error  
Handle error ⌂ More actions... ⌂  
  
Package: services  
func (AccountServer) CreateAccount(context.Context, *CreateAccountRequest) (*model.Account,  
  
Create Account  
Method which creates account with its Sub-Resources  
## Supported optional Children Sub-Resources  
* Event Summaries  
**SYSautoAccountNumberingBoo** specifies whether unique account numbers are automatically  
generated or to be assigned by the user.  
Account would be active from the go live date provided and cannot be created in pending state(  
currently restricted).Status of account decides the behavior of account and its associated entities.  
Account should choose to be of balance forward or open item accounting method.  
Account should have an accounting currency along with tax status(Tax inclusive or tax exclusive)  
which decides the products and services available for the account. General billing information  
associated with account is used for billing the account.Bill details which are mandatory for an  
account are,billing driver, next bill date, bill period, bill period units. If account's customer is  
under customer driven billing, by default account inherits all billing details from customer.  
Account driven billing requires all the bill details for creation.  
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Invoicing company is inherited from customer, if it is associated at customer,if not associated it  
is mandatory  
at account.  
Payment method must be from the list of payment methods available for invoicing company.  
Account's credit class association decides collection schedule for the account, the default credit  
limit for account which could be overridden at account level and payment due after a bill is
```

```
createAccount();  
  
public void createAccount()  
  
Create Account  
Method which creates account with its Sub-Resources  
## Supported optional Children Sub-Resources  
* Event Summaries  
**SYSautoAccountNumberingBoo** specifies whether unique account numbers are automatically  
generated or to be assigned by the user.  
Account would be active from the go live date provided.Status of account  
decides the behavior of account and its associated entities.  
Account should choose to be of balance forward or open item accounting  
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account inherits all billing details from customer. Account driven billing  
requires all the bill details for creation.  
Based on the bill style associated with the account,it becomes rating only  
account or regular account.
```

2. Продумайте Документацию!

Из тех UI доступны:

- Все API
- Все Доки
- Клиенты

The screenshot shows a web-based API documentation interface. At the top, there is a navigation bar with a home icon and the text "API DOCUMENTATION". Below this is a section titled "Available APIs" with a magnifying glass icon. A table lists four API entries, each with a checkbox, a name, a version, an SLA status, and links to documentation and clients.

	API Group	Description	API Version	SLA	Docs	Clients	Specs
<input type="checkbox"/>	core.api.nrm.netcracker.com		v2021.3.0	Production	<ul style="list-style-type: none">DocumentationSwagger UI	<ul style="list-style-type: none">GoJavaTypeScript	<ul style="list-style-type: none">Open API SpecgRPC Specs
<input type="checkbox"/>	core.api.nrm.netcracker.com		v2021.2.0	Production	<ul style="list-style-type: none">DocumentationSwagger UI	<ul style="list-style-type: none">GoJavaTypeScript	<ul style="list-style-type: none">Open API SpecgRPC Specs
<input type="checkbox"/>	core.api.nrm.netcracker.com		v2021.1.1	Production	<ul style="list-style-type: none">DocumentationSwagger UI	<ul style="list-style-type: none">GoJavaTypeScript	<ul style="list-style-type: none">Open API SpecgRPC Specs
<input type="checkbox"/>	core.api.nrm.netcracker.com		v2021.1.0	Production	<ul style="list-style-type: none">DocumentationSwagger UI	<ul style="list-style-type: none">GoJavaTypeScript	<ul style="list-style-type: none">Open API SpecgRPC Specs

2. Продумайте Документацию!

Документация должна быть понятной

- Кросс референсы
- Тестируйте на джунах/новичках

API design guide

Introduction

Resource-oriented Design

Resource names

Standard methods

Custom methods

Standard fields

Errors

Naming conventions

Design patterns

Inline API documentation

Using proto3

Versioning

Compatibility

Directory structure

File structure

Glossary

Changelog

3. Используйте Гайдлайны!

Гайдайн это:

- Стандартизация
- Подходы.
- Общие принципы и стратегии

Гайдайн не является:

- Технология
- Язык
- Фреймворк

Пункты Гуглового Гайдайна

3. Используйте Гайдлайны!

А какой использовали Вы? Напишите в чат

1. [Google](#)
2. [Microsoft](#)
3. [Postman](#)
4. [Stoplight](#)
5. [Apiguide](#)
6. Другой но чужой (напишу в комментарии)
7. Свой, корпоративный
8. Свой, личный
9. Никакой



4. Сделайте Ошибки Понятными!

- Ошибка должна однозначно ответить на вопросы:
 - Что пошло не так
 - Каково было состояние системы
 - Что вызвало ошибку
- Без логов, смс и регистрации



4. Сделайте Ошибки Понятными!

Добавьте в ошибки деталей.

Из ошибки должно быть понятно:

- Кто ходил
- Что упало
- Почему
- Как найти логи и трейсы для сессии
- Можно ли ретраинить ошибку

Body Cookies Headers (3) Test Results

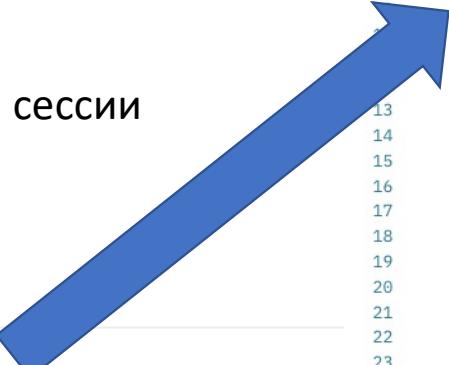
Pretty Raw Preview Visualize 

```
1 {"code": 5, "message": "not found"}
```

Body Cookies Headers (3) Test Results

Pretty Raw Preview Visualize 

```
1
2   "error": {
3     "code": 404,
4     "message": "Account with name 'accounts/AC-001' not found",
5     "status": "NOT_FOUND",
6     "details": [
7       {
8         "@type": "type.googleapis.com/google.rpc.ErrorInfo",
9         "reason": "Account with name 'accounts/AC-001' not found",
10        "domain": "account",
11        "metadata": {
12          "service": "core.api.nrm.netcracker.com",
13          "requestId": "898c4cd1-d86b-43bd-a83e-a0e9a41b1ef9",
14          "traceId": "885bef8bbc18649c",
15          "userName": "service_cloud_bss"
16        }
17      },
18      {
19        "@type": "type.googleapis.com/com.netcracker.nrm.DbInfo",
20        "queries": [
21          "select * from account where account_num = 'AC-001'"
22        ]
23      },
24      {
25        "@type": "type.googleapis.com/com.netcracker.nrm.RetryInfo",
26        "retryable": "true",
27        "nextRetryTimestamp": "1633893440"
28      }
29    ]
30  }
31 }
```



4. Сделайте Ошибки Понятными!

- Сохраняйте Ошибки
- Анализируйте
 - Используйте готовые инструменты
 - Разработайте свои инструменты

The diagram illustrates the process of handling errors. A blue arrow points from the "error.error" table in the MySQL database screenshot down to the "error" object in the Swagger UI screenshot.

Swagger UI Screenshot:

Body Cookies Headers [3] Test Results
Pretty Raw Preview Visualize Text ▾

Status: 404 Not Found

```
1
2   "error": {
3     "code": 404,
4     "message": "Account with name 'accounts/AC-001' not found",
5     "status": "NOT_FOUND",
6     "details": [
7       {
8         "@type": "type.googleapis.com/com.netcracker.nrm.ErrorInfo",
9         "errorId": "136db47b-eb6e-43fe-b8a9-f283ca8e50d7"
10      }
11    ]
12  }
13 }
```

MySQL Database Screenshot:

Output × error.error ×
DDL

id	service	instance	dbinfo	errorinfo
1	core	core-f283ca8e50d7	{queries:['select * from ...]}	{reason:'Account with name accounts/AC-001 no'}

Reload Page ⏪

Запись в таблице ошибок

4. Сделайте Ошибки Понятными!

- Шифруйте при необходимости
 - Сделайте инструменты для быстрой расшифровки командой поддержки

Body Cookies Headers (3) Test Results

Status: 404 Not Found Time: 4 ms Size: 1.98

Pretty Raw Preview Visualize Text

```
1 
2 "error": {
3   "code": 404,
4   "message": "Account with name 'accounts/AC-001' not found",
5   "status": "NOT_FOUND",
6   "details": [
7     {
8       "@type": "type.googleapis.com/com.netcracker.nrm.ErrorInfo",
9       "encryptedDetails": [
10         "4fe0e2e1f9cf595a7c83eb411d89435f6f22056aca898f4cb23fe8ff26f42a9c9cf138248fa74fcfbdebfd7482986fc634b2d2882
11         cd87122998ab4b66e3c9e4d4baeccf358884820ce1a4b90ea3db3e0a5a7e1f6465724032e0b08682b72b2be20400e9f1bbhd9c12ea52d
12         1fd7335fe9586375398180945acef6d97213a15864758b0e6e76d6e456eee0fe5dc790d7b4fd8c07b4ad409a82a019ab18d943
13         eadde44676488bd8c8cabf705d7395f70c404735f5a4311ea237f9a9a45cc0c170be8b0a16f2a5912dab41280f327001d0afaf3890ed84
14         c3b4a09fcda2b33aab50673f9aad727dc1650bbd3af0346ef57a3dd4dcc6d3ee04a24b4fc83d2b6e79c017593cf0322ede222d51277
15         a626003e67ea7179314ad1055262525a1fe26834e40c8d716b890ed7cdee75a493f35e4e4295fb1f2867d7f3d61d30117e5497f3910
16         b5cb48f19fd2e125d3da16b434be49535003b92d939ccb29a4d8746a7619b0a8967e5688f6e55957ebcd0626834a766181947cbf0e4
17         3d241603b1d1cffd1423b6404a956364d2b3c705553d23b9367bda809ea6803e1c1756d938e50a0eef8f47ae094220a0161cff2453
18         c29d6f449955c8868b6a7c35fc58d4bf71bd73401841c59a148bedbeb72a23d9b1a17c6955aaef6725690f6e5159e78788a56ded0badd
19         88c093a5700eb866bb236b23e1a8c00b3d743ac8238869ebfb44778a65fa9d60539c212ad993f52ea6fc4b6fe012a584363e8c5183a5aa4ff1d913
20         e3a1a177e78f1618a713053d225601a86fed1b56445ac0e52212940dd7a94ffdf324b303bc85b6d2e7289e4d07d015253744e81697d31d6cd716f274e01f0
21         43f4197159135662515109b1d9ff453b11e20ae16712e9998f73d2eccbf601b703aa1ac5a316653849c574"
22     },
23   ],
24 }
25 
```



500 Internal Server Error

Sorry, something went wrong.

A team of highly trained monkeys has been dispatched to deal with this situation.

If you see them, send them this information as text (screenshots frighten them).

Пример 500-тки у YouTube

4. Сделайте Ошибки Понятными!

Не забудьте:

- Ошибки – часть контракта
- Всегда документированы
- Одинаковые
- Согласованы с клиентом
- Не должны парсится как текст на клиенте!

The screenshot shows a dark-themed API documentation interface. At the top, there's a purple button labeled "PUT" and the endpoint "/account". Below this, under "Request samples", there's a "Payload" section with the following JSON content:

```
{
  "name": "AC-101",
  "id": 121,
  "type": "b2c",
  "status": "active"
}
```

Below the payload, there are buttons for "Copy", "Expand all", and "Collapse all". Under "Response samples", there are four status codes: 200 (green), 400 (red, highlighted), 401 (red), 403 (red), and 404 (red). The selected response (400) shows the following JSON content:

```
{
  "code": 400,
  "message": "Invalid account type 'bbb', only 'b2b' ar
- "details": [
    - {
        "@type": "type.googleapis.com/com.netcracker.i
        "reason": "Invalid account type 'bbb', only 'I
        "domain": "account",
        + "metadata": { ... }
    },
    - {
        "@type": "type.googleapis.com/com.netcracker.i
        "retryable": false
    }
]
}
```

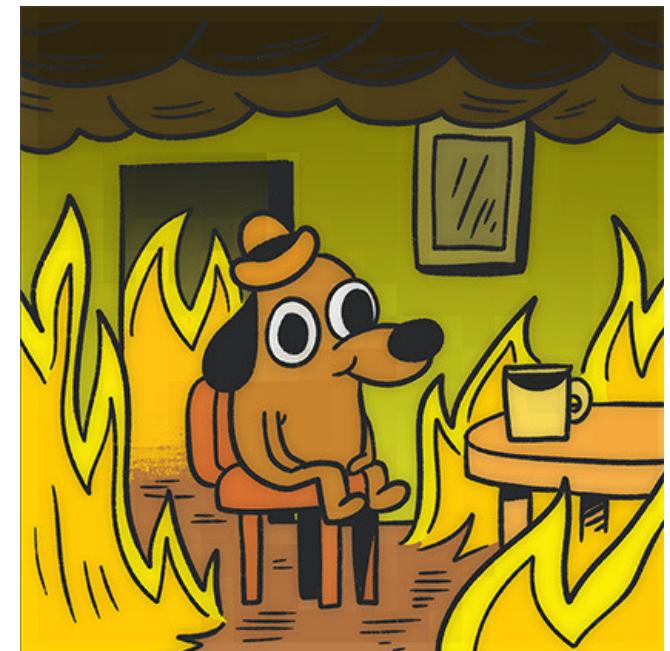
Below the response, there are buttons for "Content type" (set to "application/json") and "Copy", "Expand all", and "Collapse all".

Все коды документированы

5. Версионируйте API!

Топ 3 горячих фраз:

- “Соседняя команда выкатила ченжи вчера, нам надо поддержать до завтра!”
- “Ой, забыли сказать, мы там лишние поля поудаляли”
- “Да все равно никто этим не пользовался”



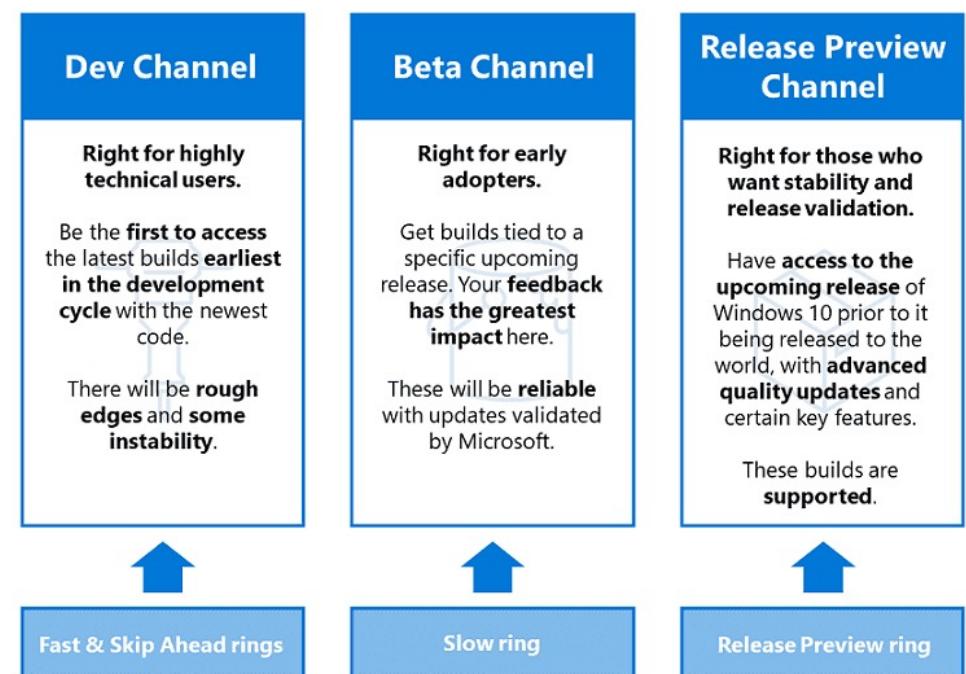
5. Версионируйте API!

- Договоритесь о стратегии с пользователями.
 - Версионировать
 - Не Версионировать
- Что версионировать
 - Операции
 - API целиком
- Что есть изменения контракта
 - Какие изменения требуют отведения новой версии

5. Версионируйте API!

Как получать API?

- Используйте Каналы
- Определитесь с политиками стабильно Вашего API



5. Версионируйте API!

Договоритесь о политике поддержки и устаревания:

- Обсудите сроки поддержки версий с клиентами
- Убедитесь что все запрошенные клиентом изменения попали в стабильную версию

Stability Level	Частота Выпуска	Время Жизни	Всего поддерживается
Alpha	Каждый спринт (2 недели)	3 Спринта	3
Beta	Каждые 3 спрингта (2 раза в квартал)	2 квартала	6
GA	Каждый квартал	2 года	8

Пример нашей политики поддержки

5. Версионируйте API!

Ведите ченжлоги:

- Документируйте **ВСЕ** изменения между версиями
- Опишите стратегию перехода при не обратно совместимых изменениях
- Сделайте свои инструменты для сравнения

Notes for this delivery:	
Release Notes	<ul style="list-style-type: none">• https://wiki
'New' in this release	<ul style="list-style-type: none">• v1alpha4 version is added (will be available till 15.11.2021)• v1alpha3 version is available (will be available till 1.11.2021)• v1alpha2 version is available (will be available till 15.10.2021)• v1alpha1 has been removed• v2021.3 version available based on v1alpha1
Known Issues	
Special Instructions	Breaking changes in customer domain in version v1alpha33 comparing to v1alpha32 Refer to release notes to see details.

v1.8.0 Tags > v1.8.0

v1.8.0
b2f31e83 ·

Breaking Changes

Ticket-1 Migrate Customer Provisioning New 3rd Party API
Customer provisioning now works with v2 version of provisioning API.
Customer Model Changes:

- Field `address` was renamed to `effective_address`;
- Field `provisioning_status` was removed.

Ticket-5 Make Provisioning Long-Running Operation
Provisioning API is now long-running operation. See [guide](#) how to migrate to new API.

Major Changes

Ticket-2 Add Telegram Username To Customer Contacts
Field `telegram` was added to Contacts model.

Minor Changes

Ticket-3 Migrated To OpenTelemetry v1.0.0
OpenTelemetry dependency was updated from v0.23.0 to v1.0.0

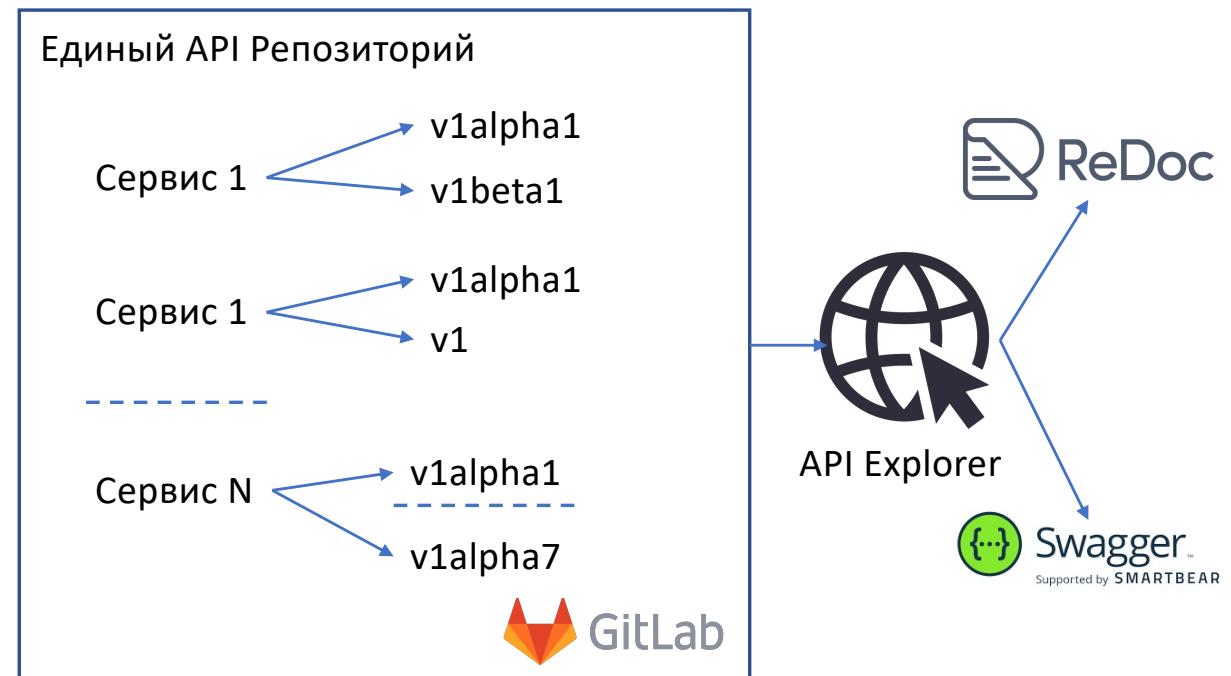
Bug Fixed

Ticket-4 Fixed Tax Calculations For US Domain

5. Версионируйте API!

Храните Одном Месте

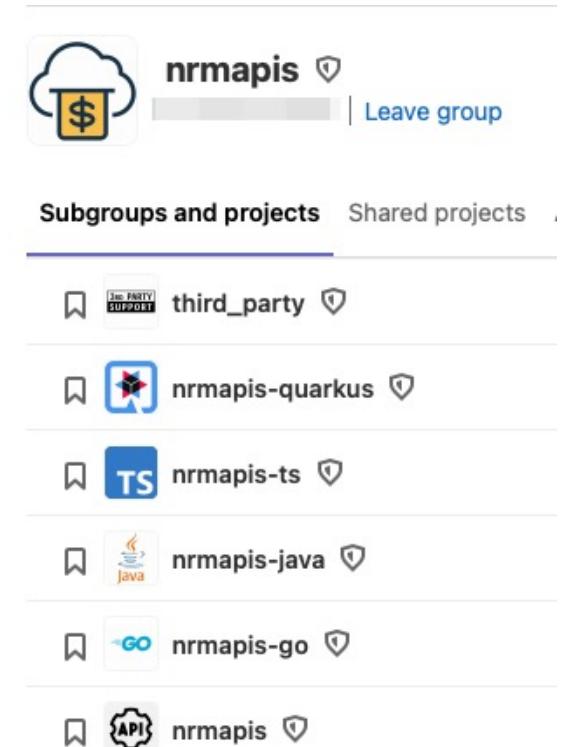
- Общее хранилище для документации и API
- Единый сервис для просмотра и сравнения
- Храните все исторические версии
- Автоматизируйте процессы генерации.



Из API Explorer можно просмотреть документацию всех сервисов и версий, даже уже неподдерживаемых.

6. Генерируйте Клиентов!

- Зачем?
 - Вы знаете поведение системы
 - Нет подводных камней
 - API работает так как вы задумывали
- Сделайте утилиты для упрощения работы

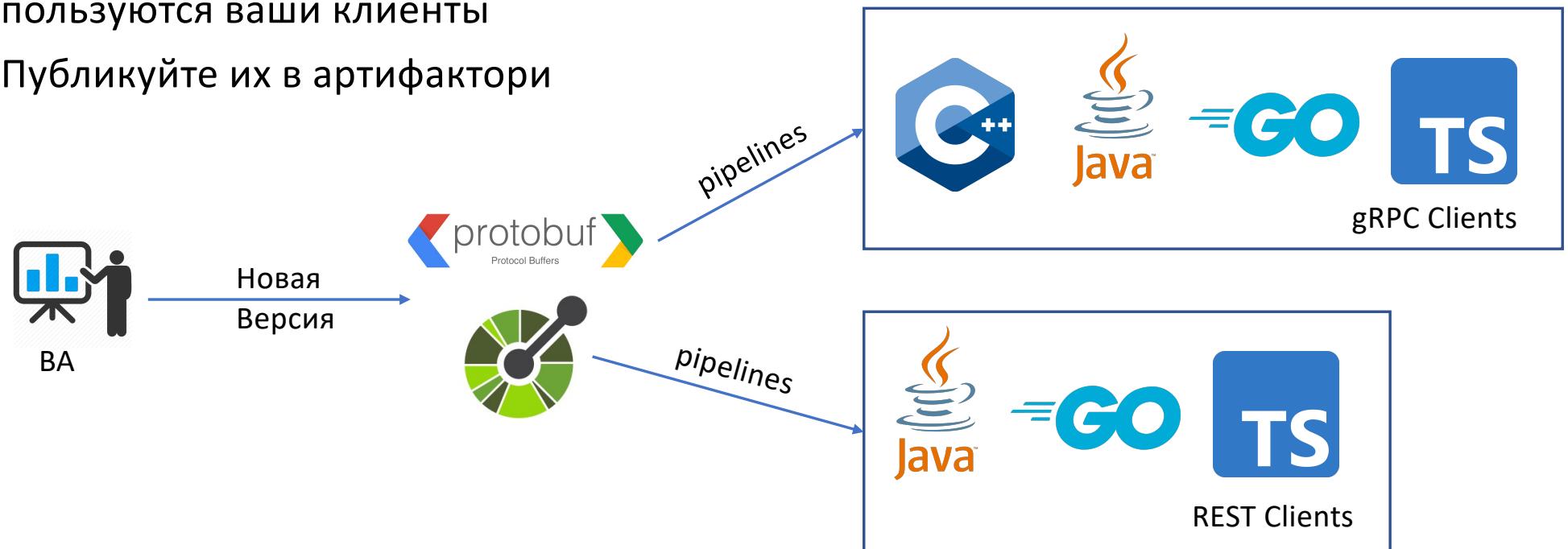


API и клиенты под разные языки
Находятся в одном репозитории

6. Генерируйте Клиентов!

Автоматизируйте Генерацию

- Генерируйте под все языки, которыми пользуются ваши клиенты
- Публикуйте их в артифактори



Заключение

Чеклист:

1. Не трогайте пока не поняли
2. Сделайте хорошую документацию
3. Следуйте гайдлайнам
4. Выжмите все из ошибок
5. Версионируйте API
6. Заботьтесь о клиентах ваших сервисов

Q&A