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Кафедра ИУ5 «Системы обработки информации и управления»

Курс «Базовые компоненты интернет-технологий»

Отчет по домашнему заданию

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Описание задания

1. Модифицировать код лабораторной работы №6 таким образом, чтобы он был пригоден для модульного тестирования.
2. Используя материалы лабораторной работы №4 создать модульные тесты с применением TDD - фреймворка (2 теста) и BDD - фреймворка (2 теста).

Текст программы

Файл **bot.py**:

```python
from resources.config import TOKEN
from resources.messages import MESSAGES
import logging
from aiogram import Bot, Dispatcher, executor, types
from aiogram.contrib.fsm_storage.memory import MemoryStorage
from handlers.common import register_message_handlers
from handlers.callback_queries import register_callback_query_handlers


logging.basicConfig(level=logging.INFO)

storage = MemoryStorage()
bot = Bot(token=TOKEN)
dp = Dispatcher(bot, storage=storage)


if __name__ == "__main__":
    register_message_handlers(dp)
    register_callback_query_handlers(dp)
    dp.bot.set_my_commands([
        types.BotCommand("start", "Запустить бота"),
        types.BotCommand("help", "Помощь"),
        types.BotCommand("cancel", "Отменить текущую операцию")
    ])
    executor.start_polling(dp, skip_updates=True)
```

Файл **markups.py**:

```python
from aiogram.types import InlineKeyboardMarkup, InlineKeyboardButton

start_menu =InlineKeyboardMarkup(row_width=1)
btnStart = InlineKeyboardButton(text="✅Начать", callback_data="btnStart")

start_menu.insert(btnStart)

from_menu = InlineKeyboardMarkup(row_width=2)
btn_BTC = InlineKeyboardButton(text="Bitcoin", callback_data="btn_BTC")
```

```python
btn_ETH = InlineKeyboardButton(text="⑤Ethereum", callback_data="btn_ETH")
btn_XRP = InlineKeyboardButton(text="▧XRP", callback_data="btn_XRP")
btn_SOL = InlineKeyboardButton(text="🤖Solana", callback_data="btn_SOL")

from_menu.insert(btn_BTC)
from_menu.insert(btn_ETH)
from_menu.insert(btn_XRP)
from_menu.insert(btn_SOL)

to_menu = InlineKeyboardMarkup(row_width=2)
btn_USD = InlineKeyboardButton(text="🇺🇸USD", callback_data="btn_USD")
btn_RUB = InlineKeyboardButton(text="ʀᴜRUB", callback_data="btn_RUB")
btn_EUR = InlineKeyboardButton(text="🇪🇺EUR", callback_data="btn_EUR")
btn_UAH = InlineKeyboardButton(text="ᴜᴀUAH", callback_data="btn_UAH")
btn_back_from = InlineKeyboardButton(text="Назад", callback_data="btn_back_from")

to_menu.insert(btn_USD)
to_menu.insert(btn_RUB)
to_menu.insert(btn_EUR)
to_menu.insert(btn_UAH)
to_menu.insert(btn_back_from)

choice_menu = InlineKeyboardMarkup(row_width=1)
btn_back_crypto = InlineKeyboardButton(text="Назад к выбору криптовалюты",
callback_data="btn_crypto")
btn_back_curr =  InlineKeyboardButton(text="Назад к выбору валюты для конвертации",
callback_data="btn_curr")
btn_result = InlineKeyboardButton(text="Показать результат",
callback_data="btn_result")

choice_menu.insert(btn_result)
choice_menu.insert(btn_back_crypto)
choice_menu.insert(btn_back_curr)

final_menu = InlineKeyboardMarkup(row_width=1)
btn_retry = InlineKeyboardButton(text="Обновить курс", callback_data="btn_retry")
btn_finish =  InlineKeyboardButton(text="Завершить/Начать заново",
callback_data="btn_finish")

final_menu.insert(btn_retry)
final_menu.insert(btn_finish)

help_menu = InlineKeyboardMarkup(row_width=1)
btn_accept = InlineKeyboardButton(text="Понятно", callback_data="accept")

help_menu.insert(btn_accept)
```

Файл **request.py**:

```python
from requests import Session
from requests.exceptions import ConnectionError, Timeout, TooManyRedirects
from resources.config import CRYPTO_API_TOKEN
import json


def get_exchange_rate(crypto, curr):
    url = "https://min-api.cryptocompare.com/data/price"
    parameters = {"fsym": crypto, "tsyms": curr, "api_key": CRYPTO_API_TOKEN}

    session = Session()

    try:
        response = session.get(url, params=parameters)
        data = json.loads(response.text)
        return data[curr]
    except (ConnectionError, Timeout, TooManyRedirects) as e:
        print(e)
    finally:
        session.close()
```

Файл **resources/config.py**:

```python
from aiogram.dispatcher.filters.state import State, StatesGroup

TOKEN = "***"

CRYPTO_API_TOKEN = "***"

db_file = "resources/db.vdb"

class States(StatesGroup):
    state_start = State()
    state_from_currency = State()
    state_to_currency = State()
    state_choice = State()
    state_result = State()
```

Файл **resources/messages.py**:

```python
start_message = """
*Привет, пользователь!*

Этот бот позволяет узнать текущий курс самых популярных криптовалют
(🎖_Bitcoin_,💲_Ethereum_ и др.).

Для получения курса нажмите на кнопку "Начать" ниже:
"""

from_currency_message = """
```

```python
Выберите криптовалюту нажатием кнопки ниже:
"""

err_message = """
*Нет такой команды!*
"""


to_currency_message = """
Выбранная криптовалюта: *{}*

Выберите валюту для конвертации нажатием кнопки ниже:
"""


choice_message = """
Выбранная пара для конвертации: *{}* -> *{}*

Выберите действие нажатием кнопки ниже:
"""

result_message = """
_Текущий курс:_

    *1* *{}* -> *{}*

Выберите действие нажатием кнопки ниже:
"""

cancel_message = '''
*Текущая операция отменена*

Введите /help или /start чтобы начать заново:
'''

help_message = '''
Для отмены текущей операции напишите /cancel

Для продолжения нажмите "Понятно" ниже:
'''

MESSAGES = {
    'States:state_start': start_message,
    'States:state_from_currency': from_currency_message,
    'States:state_to_currency': to_currency_message,
    'States:state_choice': choice_message,
    'States:state_result': result_message,
    'err': err_message,
    'cancel':cancel_message,
    'help': help_message
```

}

Файл **handlers/callback_queries.py**:

```python
from aiogram.dispatcher.dispatcher import Dispatcher
from aiogram.dispatcher.storage import FSMContext
from resources.config import States
import dbworker
import markups
from aiogram.dispatcher.filters import Text
from aiogram import types
from resources.messages import MESSAGES
from request import get_exchange_rate
from number_format import cformat


# Обрабатываем /help
async def handle_help(call: types.CallbackQuery, state: FSMContext):
    await call.answer()
    bot = call.bot
    await bot.delete_message(call.from_user.id, call.message.message_id)

# Начинаем ввод данных (STATE_START -> STATE_FROM_CURRENCY)
async def handle_start(call: types.CallbackQuery, state: FSMContext):
    await call.answer()
    await state.finish()
    bot = call.bot
    await bot.delete_message(call.from_user.id, call.message.message_id)
    await States.state_from_currency.set()
    await bot.send_message(call.from_user.id, text=MESSAGES[await
state.get_state()], reply_markup=markups.from_menu, parse_mode="Markdown")


# Выбираем криптовалюту (STATE_FROM_CURRENCY -> STATE_TO_CURRENCY)
async def handle_crypto(call: types.CallbackQuery, state: FSMContext):
    await call.answer()
    bot = call.bot
    await bot.delete_message(call.from_user.id, call.message.message_id)
    from_currency = call.data.split('_')[1]
    dbworker.set(dbworker.make_key(call.from_user.id, "FROM_CURRENCY"),
from_currency)
    await States.state_to_currency.set()
    await bot.send_message(
        call.from_user.id,
        text=MESSAGES[await
state.get_state()].format(dbworker.get(dbworker.make_key(call.from_user.id,
"FROM_CURRENCY"))),
        parse_mode="Markdown",
        reply_markup=markups.to_menu
    )
```

```python
# Выбираем валюту (STATE_TO_CURRENCY -> STATE_CHOICE)
async def handle_curr(call: types.CallbackQuery, state: FSMContext):
    await call.answer()
    bot = call.bot
    await bot.delete_message(call.from_user.id, call.message.message_id)
    to_currency = call.data.split('_')[1]
    if to_currency != "back":
        dbworker.set(dbworker.make_key(call.from_user.id, "TO_CURRENCY"),
to_currency)
        await States.state_choice.set()
        await bot.send_message(
            call.from_user.id,
            text=MESSAGES[await state.get_state()].format(
                dbworker.get(dbworker.make_key(call.from_user.id,
"FROM_CURRENCY")),
                dbworker.get(dbworker.make_key(call.from_user.id, "TO_CURRENCY"))
            ),
            reply_markup=markups.choice_menu,
            parse_mode="Markdown"
        )
    else:
        await States.state_from_currency.set()
        await bot.send_message(
            call.from_user.id,
            text="Выберите криптовалюту: ",
            reply_markup=markups.from_menu,
            parse_mode="Markdown"
        )

# Выбираем действие (STATE_CHOICE -> STATE_RESULT)
async def handle_choice(call: types.CallbackQuery, state: FSMContext):
    await call.answer()
    bot = call.bot
    await bot.delete_message(call.from_user.id, call.message.message_id)
    choice = call.data.split('_')[1]
    if choice == "result":
        from_currency = dbworker.get(dbworker.make_key(call.from_user.id,
"FROM_CURRENCY"))
        to_currency = dbworker.get(dbworker.make_key(call.from_user.id,
"TO_CURRENCY"))
        result = cformat(float(get_exchange_rate(from_currency, to_currency)),
to_currency)
        await States.state_result.set()
        await bot.send_message(
            call.from_user.id,
            text=MESSAGES[await state.get_state()].format(
                from_currency,
                result
```

```python
                ),
                reply_markup=markups.final_menu,
                parse_mode="Markdown"
            )
        else:
            if choice == "crypto":
                await States.state_from_currency.set()
                await bot.send_message(
                    call.from_user.id,
                    text=MESSAGES[await state.get_state()],
                    reply_markup=markups.from_menu,
                    parse_mode="Markdown"
                )
            else:
                await States.state_to_currency.set()
                await bot.send_message(
                    call.from_user.id,
                    text=MESSAGES[await
state.get_state()].format(dbworker.get(dbworker.make_key(call.from_user.id,
"FROM_CURRENCY"))),
                    reply_markup=markups.to_menu,
                    parse_mode="Markdown"
                )


# Финальный выбор
async def handle_result(call: types.CallbackQuery, state: FSMContext):
    await call.answer()
    bot = call.bot
    await bot.delete_message(call.from_user.id, call.message.message_id)
    choice = call.data.split('_')[1]
    if choice == "retry":
        from_currency = dbworker.get(dbworker.make_key(call.from_user.id,
"FROM_CURRENCY"))
        to_currency = dbworker.get(dbworker.make_key(call.from_user.id,
"TO_CURRENCY"))
        result = cformat(float(get_exchange_rate(from_currency, to_currency)),
to_currency)
        await bot.send_message(
            call.from_user.id,
            text=MESSAGES[await state.get_state()].format(
                from_currency,
                result
            ),
            reply_markup=markups.final_menu,
            parse_mode="Markdown"
        )
    else:
        await States.state_start.set()
        await bot.send_message(
            call.from_user.id,
```

```python
            text=MESSAGES[await state.get_state()],
            reply_markup=markups.start_menu,
            parse_mode="Markdown"
        )


def register_callback_query_handlers(dp: Dispatcher):
    dp.register_callback_query_handler(handle_start, text="btnStart",
state=States.state_start)
    dp.register_callback_query_handler(handle_crypto, Text(startswith="btn"),
state=States.state_from_currency)
    dp.register_callback_query_handler(handle_curr, Text(startswith="btn"),
state=States.state_to_currency)
    dp.register_callback_query_handler(handle_choice, Text(startswith="btn"),
state=States.state_choice)
    dp.register_callback_query_handler(handle_result, Text(startswith="btn"),
state=States.state_result)
    dp.register_callback_query_handler(handle_help, text="accept", state='*')
```

Файл **handlers/common.py**:

```python
# Начало диалога (. -> STATE_START)
from aiogram import types
from aiogram.dispatcher.dispatcher import Dispatcher
from aiogram.dispatcher.storage import FSMContext
from resources.config import States
import dbworker
import markups
from resources.messages import MESSAGES
from request import get_exchange_rate
from number_format import cformat


async def cmd_start(message: types.Message, state: FSMContext):
    await States.state_start.set()
    await message.answer(MESSAGES[await state.get_state()], parse_mode="Markdown",
reply_markup=markups.start_menu)


async def cmd_cancel(message: types.Message, state: FSMContext):
    if await state.get_state() == None:
        return
    else:
        await state.finish()
        await message.answer(MESSAGES['cancel'], parse_mode="Markdown")


async def cmd_help(message: types.Message, state: FSMContext):
    await message.answer(MESSAGES['help'], parse_mode="Markdown",
reply_markup=markups.help_menu)
```

```python
async def err_handle(message: types.Message, state: FSMContext):
    if await state.get_state() == None:
        return
    current_state = await state.get_state()
    reply_markup = None
    reply_msg = ''
    if current_state == 'States:state_start':
        reply_msg = MESSAGES['err'] + MESSAGES[current_state]
        reply_markup = markups.start_menu
    elif current_state == 'States:state_from_currency':
        reply_msg = MESSAGES['err'] + MESSAGES[current_state]
        reply_markup = markups.from_menu
    elif current_state == 'States:state_to_currency':
        reply_msg = MESSAGES['err'] +
MESSAGES[current_state].format(dbworker.get(dbworker.make_key(message.from_user.id,
"FROM_CURRENCY")))
        reply_markup = markups.to_menu
    elif current_state == 'States:state_choice':
        reply_msg = MESSAGES['err'] + MESSAGES[current_state].format(
            dbworker.get(dbworker.make_key(message.from_user.id, "FROM_CURRENCY")),
            dbworker.get(dbworker.make_key(message.from_user.id, "TO_CURRENCY"))
        )
        reply_markup = markups.choice_menu
    elif current_state == 'States:state_result':
        from_currency = dbworker.get(dbworker.make_key(message.from_user.id,
"FROM_CURRENCY"))
        to_currency = dbworker.get(dbworker.make_key(message.from_user.id,
"TO_CURRENCY"))
        result = cformat(float(get_exchange_rate(from_currency, to_currency)),
to_currency, locale="ru_RU")

        reply_msg = MESSAGES['err'] + MESSAGES[current_state].format(
            from_currency,
            result
        )
        reply_markup = markups.final_menu


    await message.answer(reply_msg, parse_mode="Markdown",
reply_markup=reply_markup)


def register_message_handlers(dp: Dispatcher):
    dp.register_message_handler(cmd_start, commands=['start', 'help'])
    dp.register_message_handler(cmd_cancel, commands=['cancel'], state="*")
    dp.register_message_handler(cmd_help, commands=['help'], state="*")
    dp.register_message_handler(err_handle, state="*")
```

Файл **handlers/db_worker.py**:

```python
from vedis import Vedis
from resources import config


def get(key):
    with Vedis(config.db_file) as db:
        try:
            return db[key].decode()
        except KeyError:
            # в случае ошибки значение по умолчанию - начало диалога
            return config.States.S_START.value


def set(key, value):
    with Vedis(config.db_file) as db:
        try:
            db[key] = value
            return True
        except:
            return False


def make_key(chatid, keyid):
    res = str(chatid) + '__' + str(keyid)
    return res
```

Файл **tests/test_request.py**:

```python
import unittest
from ..request import get_exchange_rate
from ..number_format import cformat

class TestBotUtilities(unittest.TestCase):
    def test_cformat(self):
        self.assertEqual(cformat(1000, "RUB"), "1 000,00 ₽")
        self.assertEqual(cformat(1000, "USD"), "1 000,00 $")

    def test_get_exchange_rate(self):
        self.assertGreater(get_exchange_rate("BTC", "USD"), 30000)
        self.assertLess(get_exchange_rate("BTC", "USD"), 70000)


if __name__ == "__main__":
    unittest.main()
```

Файл **tests/features/cformat_test.feature**:

```
Feature: Right formatting of currency
```

```
Scenario: 1000 RUB
  Given Number is 1000, currency is RUB
  Then Result must be _1 000,00 ₽_

Scenario: 1000 USD
  Given Number is 1000, currency is USD
  Then Result must be _1 000,00 $_
```

Файл **tests/features/get_exchange_rate_test.feature**:

```
Feature: Right Currency Choosing

  Scenario: XRP TO RUB
    Given Crypto currency is XRP, to currency is RUB
    Then Result must be between 60 and 90

  Scenario: BTC TO USD
    Given Crypto currency is BTC, to currency is USD
    Then Result must be between 30000 and 60000
```

Файл **tests/features/steps/test_bot_utils_bdd.py**:

```python
from behave import given, then
from request import get_exchange_rate
from number_format import cformat


@given("Crypto currency is {crypto}, to currency is {curr}")
def have_convert_params(context, crypto, curr):
    context.crypto = crypto
    context.curr = curr

@then("Result must be between {from_curr} and {to}")
def expect_result(context, from_curr, to):
    assert get_exchange_rate(context.crypto, context.curr) > float(from_curr)
    assert get_exchange_rate(context.crypto, context.curr) < float(to)


@given("Number is {number}, currency is {curr}")
def have_convert_params(context, number, curr):
    context.number = number
    context.curr = curr

@then("Result must be _{result}_")
def expect_result(context, result):
    assert cformat(float(context.number), context.curr) == result
```

Пример выполнения программы

/start 22:27 ✓✓

Привет, пользователь!

Этот бот позволяет узнать текущий курс самых популярных криптовалют (💸 *Bitcoin*, 💰 *Ethereum* и др.).

Для получения курса нажмите на кнопку "Начать" ниже: 22:27

✅ Начать

Выберите криптовалюту нажатием кнопки ниже: 22:29 👍

🌑 Bitcoin   💰 Ethereum

💸 XRP   🤑 Solana

Выбранная криптовалюта: **BTC**

Выберите валюту для конвертации нажатием кнопки ниже:

22:30 👍

💱 USD   🇷🇺 RUB

💶 EUR   🇺🇦 UAH

Назад

Выбранная пара для конвертации: **BTC -> RUB**

Выберите действие нажатием кнопки ниже: 22:31 👍

Показать результат

Назад к выбору криптовалюты

Назад к выбору валюты для конвертации

Текущий курс:

1 BTC -> 3 328 345,75 ₽

Выберите действие нажатием кнопки ниже: 22:31

Обновить курс

Завершить/Начать заново

Результаты тестов:

```
=============
TDD
=============

..
----------------------------------------------------------------------
Ran 2 tests in 4.052s

OK


=============
BDD
=============

Feature: Right formatting of currency # features/cformat_test.feature:1

  Scenario: 1000 RUB                   # features/cformat_test.feature:3
    Given Number is 1000, currency is RUB # features/steps/test_bot_utils_bdd.py:40
    Then Result must be _1 000,00 ₽_      # features/steps/test_bot_utils_bdd.py:46

  Scenario: 1000 USD                   # features/cformat_test.feature:7
    Given Number is 1000, currency is USD # features/steps/test_bot_utils_bdd.py:40
    Then Result must be _1 000,00 $_      # features/steps/test_bot_utils_bdd.py:46

Feature: Right Currency Choosing # features/get_exchange_rate_test.feature:1

  Scenario: XRP TO RUB                             # features/get_exchange_rate_test.feature:3
    Given Crypto currency is XRP, to currency is RUB # features/steps/test_bot_utils_bdd.py:29
    Then Result must be between 60 and 90            # features/steps/test_bot_utils_bdd.py:35

  Scenario: BTC TO USD                             # features/get_exchange_rate_test.feature:7
    Given Crypto currency is BTC, to currency is USD # features/steps/test_bot_utils_bdd.py:29
    Then Result must be between 30000 and 60000      # features/steps/test_bot_utils_bdd.py:35

2 features passed, 0 failed, 0 skipped
4 scenarios passed, 0 failed, 0 skipped
8 steps passed, 0 failed, 0 skipped, 0 undefined
Took 0m7.039s
```