



요리용 코딩언어 개발

-요리 레시피 기술을 위한 도메인 특화 언어 Swifood-



연구 배경

- 음악, 영화, 드라마 등의 세계 각국의 문화 콘텐츠에 대한 관심 증가
- 세계 각국의 다양한 요리에 대한 관심도 증가
- 인터넷의 발달로 요리 레시피의 공유 증가
- 인공지능 및 컴퓨터 비전의 발달과 자동화 조리
- 새로운 레시피 기술 방법에 대한 필요성 증가



기존 레시피의 문제점

Ingredients

For the spiced butter

125g/4oz lightly salted butter, softened

110g/3¾oz demerara sugar

½ tsp ground cinnamon

½ tsp allspice

¼ tsp ground cloves

freshly grated nutmeg, to taste

To serve

750ml/1½ pints cloudy or freshly pressed apple juice

30ml/1fl oz fresh lemon juice

freshly grated nutmeg, to garnish

Method

1. To make the spiced butter, scoop the softened butter into a bowl and add the demerara sugar. Beat together with electric beaters until smoothly combined.

2. Add all the spices and beat again. Scoop into a tub, seal and store in the fridge until needed. The butter will keep in the fridge for up to 4 weeks.

3. Pour the apple and lemon juices into a saucepan over a medium heat. Cover with a lid and gently warm for 5–6 minutes until steaming hot. Scoop the spiced butter into the pan and stir until dissolved (see above for instructions if you are not serving all at once). Ladle the buttered apple juice into mugs or heatproof glasses and grate over a little extra nutmeg to serve.

- 작성자에 따라 문장 구조가 달라져 일관성이 부족
- 자동화 조리에 활용하기 부적합
- 작업의 병렬화 어려움
- 데이터 분석 및 문제점 파악, 기능 확장 어려움

https://www.bbc.co.uk/food/recipes/hot_buttered_apple_juice_84111

Ingredients

1 litre/1¾ pints apple juice

1 cinnamon stick, plus 6 to garnish

6 cloves

4 wide strips orange zest

1 knob stem ginger in syrup, sliced, plus 1 tbsp syrup (optional)

small pinch ground allspice

Method

1. Put all of the ingredients in a saucepan and bring to a simmer over medium heat.

2. Turn heat down to low for 15 minutes, then strain.

3. Pour in to mugs and garnish each with a cinnamon stick.



https://www.bbc.co.uk/food/recipes/warm_apple_punch_17914

Swifood 1: Swifood 소개



Swifood, Recipe Coding Language

요리 레시피 기술을 위한 도메인 특화 언어

핵심 기능

- 코드 파싱 및 분석
- 레시피 오류 자동 검출
- 필요 도구 자동 분석
- 레시피 출력

사용 기술

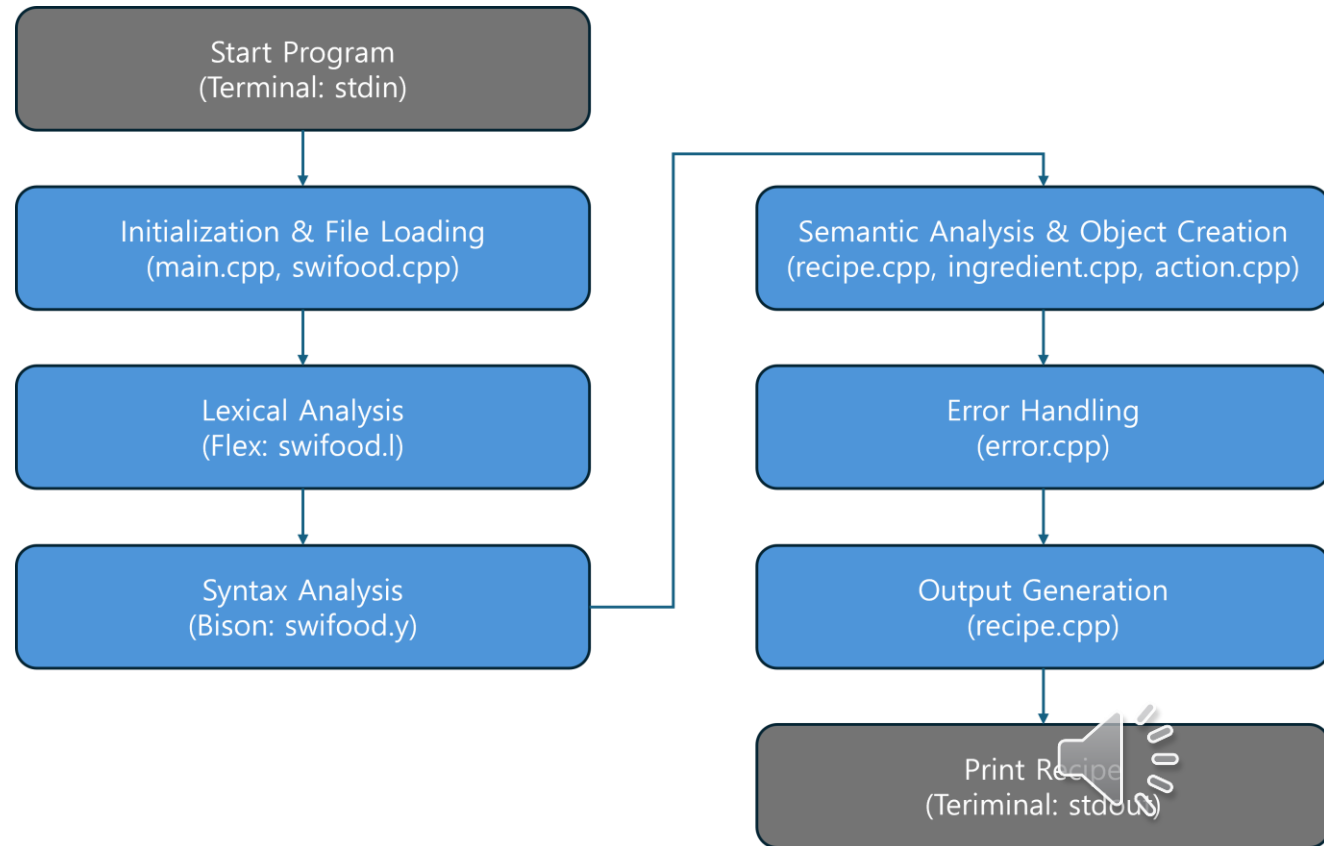
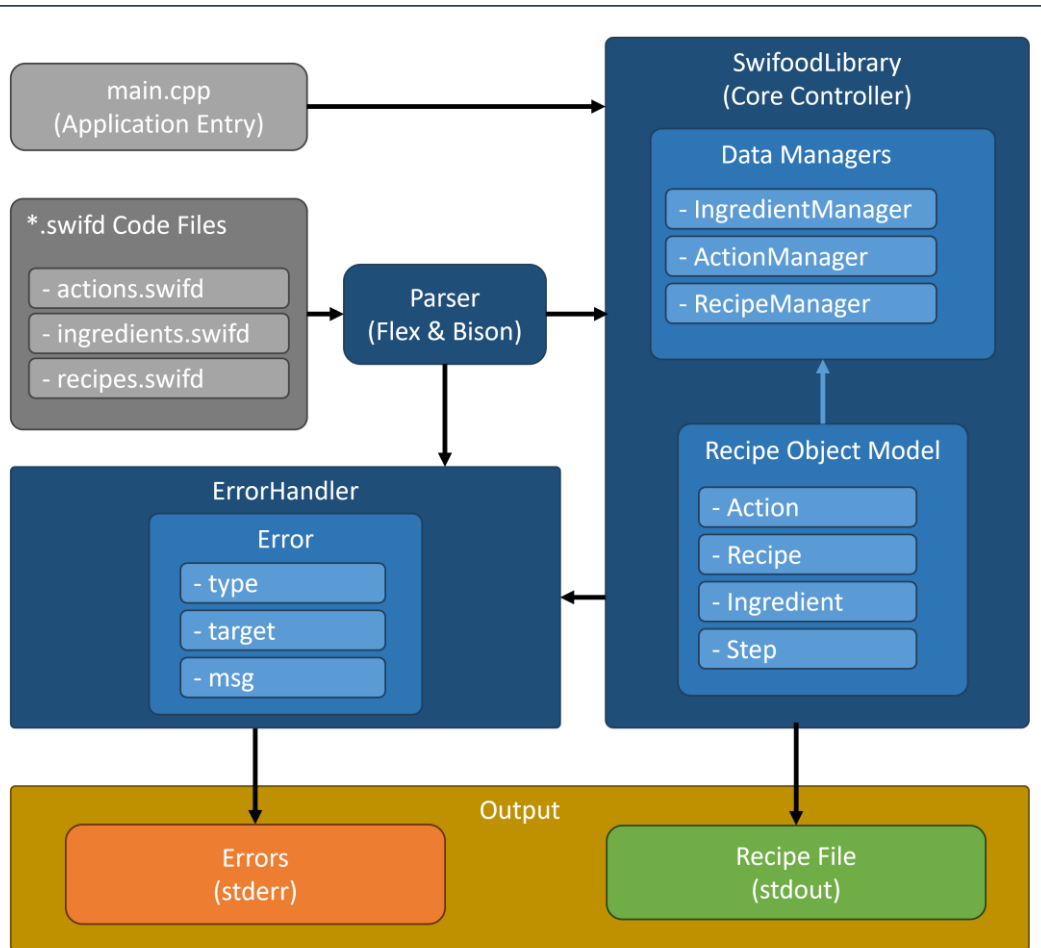
- GCC (C++)
- Flex
- Bison
- Make

개발 환경

- macOS Sequoia 15.6.1
- Visual Studio Code
- zsh



Swifood 2: Swifood 구조



Swifood 3: Swifood 동작 1

```
Ingredient {  
  Water,  
  salt,  
  Egg  
}
```

```
Ingredient Vegetable {  
  Lettuce,  
  Carrot  
}
```

```
Action boil $I {  
  in: pot,  
  (for: $D | until: $C)  
}
```

```
Action fry $I {  
  in: pan,  
  (for: $D | until: $C)  
}
```

```
Action mix $I {  
  in: bowl,  
  with: spoon  
}
```

```
Recipe Boiled_Egg {  
  Ingredients:  
    Egg 4ea, Salt 8g, Water.  
  
  Steps:  
    put [Water, Salt] (in: pot).  
    heat pot (until: boils).  
    boil Egg (for: 00:07:00).  
}
```

```
Recipe Test_Analyze_Equipments {  
  Ingredients:  
    Egg 4ea.  
  
  Steps:  
    boil Egg (for: 00:07:00).  
}
```

```
Recipe Boiled_Egg {  
  Ingredients:  
    Egg 4ea, Salt 8g, Water.  
  
  Steps:  
    put [Water, Salt] (in: pot).  
    heat pot (until: boils).  
    boil Egg (for: 00:07:00).  
}
```

소스 코드

```
sunjae@Sunjae-MacBook-Air swifood % ./swifood Boiled_Egg  
[Boiled_Egg]  
--- Equipments ---  
pot  
--- Ingredients ---  
* Egg 4ea  
* Salt 8g  
* Water  
--- Method ---  
1. Put Water, and Salt in pot.  
2. Heat pot until boils.  
3. Boil Egg in pot for 00:07:00.  
sunjae@Sunjae-MacBook-Air swifood %
```

출력 결과

정상적인 레시피

```
Recipe Test_Recipe_Error_Check_Two {  
  Ingredients:  
    Egg 4ea.  
  
  Steps:  
    put Water (in: pot).  
    boil Egg (for: 00:07:00).  
}
```

소스 코드

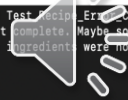
```
sunjae@Sunjae-MacBook-Air swifood % ./swifood Test_Recipe_Error_Check_Two  
Error: Recipe 'Test_Recipe_Error_Check_Two' is not complete. Maybe some ingredients were not used. (List: [ ]). Maybe some ingredients were not declared. (List: [ Water ])  
1 errors are found.  
sunjae@Sunjae-MacBook-Air swifood %
```

출력 결과

오류가 검출된 레시피 (선언되지 않은 재료 사용)

```
Recipe Test_Recipe_Error_Check {  
  Ingredients:  
    Egg 4ea, Salt, Water.  
  
  Steps:  
    put Water (in: pot).  
    boil Egg (for: 00:07:00).  
}
```

소스 코드

```
sunjae@Sunjae-MacBook-Air swifood % ./swifood Test_Recipe_Error_Check  
Error: Recipe 'Test_Recipe_Error_Check' is not complete. Maybe some ingredients were not used. (List: [ Salt ]). Maybe some ingredients were not declared. (List: [ ])   
1 errors are found.  
sunjae@Sunjae-MacBook-Air swifood %
```

출력 결과

오류가 검출된 레시피 (사용되지 않은 재료 검출)

Swifood 4: Swifood 동작 2

```
Recipe Test_Using_Self {  
  Ingredients:  
    Test_Using_Self.  
  
  Steps:  
    put Test_Using_Self (in: pot).  
}
```



```
sunjae@Sunjae-MacBook-Air Swifood % ./swifood Test_Using_Self  
Error: Recipe 'Test_Using_Self' is using itself as ingredient.  
Error: Recipe 'Test_Using_Self' has 1 problems in <Ingredients>.  
2 errors are found.
```

```
Recipe Boiled_Egg {  
  Ingredients:  
    Egg 4ea, Salt 8g, Water.  
  
  Steps:  
    put [Water, Salt] (in: pot).  
    heat pot (until: boils).  
    boil Egg (for: 00:07:00).  
}  
  
Recipe Double_Boiled_Egg {  
  Ingredients:  
    Boiled_Egg 4ea, Water.  
  
  Steps:  
    put [Boiled_Egg, Water] (in: pot).  
    heat pot (until: boils).  
    boil Boiled_Egg (for: 00:07:00).  
}
```



```
[sunjae@Sunjae-MacBook-Air swifood % ./swifood Double_Boiled_Egg  
[Double_Boiled_Egg]  
  
--- Equipments ---  
pot  
  
--- Ingredients ---  
* Boiled_Egg 4ea  
* Water  
  
--- Method ---  
1. Put Boiled_Egg, and Water in pot.  
2. Heat pot until boils.  
3. Boil Boiled_Egg in pot for 00:07:00.  
  
--- Related recipes ---  
[Boiled_Egg]  
  
--- Equipments ---  
pot  
  
--- Ingredients ---  
* Egg 4ea  
* Salt 8g  
* Water  
  
--- Method ---  
1. Put Water, and Salt in pot.  
2. Heat pot until boils.  
3. Boil Egg in pot for 00:07:00.
```



결과 및 개선 사항

과제 결과

- 기존 레시피의 문장 구조와 유사한 문법으로 사람이 이해하기 쉬우며, 기존 레시피를 변환하기 용이한 구조로 설계됨
- 기계 친화적인 코드로 변환하기 용이한 구조로 설계하여 향후 자동화 요리에 적용할 수 있게 제작함

개선 사항

- 개선된 텍스트 출력 포맷, GUI 출력 등 보다 나은 출력 기능 추가
- XOR Parameter와 Required Parameter를 추가하여 Action의 정의를 확장
- 에러 처리를 세분화하여 코드 작성 중 발생하는 문제 해결이 용이하도록 개선



감사합니다

