

## Python 3.15.0a3 ve 3.11.14 Mikrobenchmark Performans Analizi

Mehmet Keçeci

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### Özet/Abstract:

Python 3.15.0a3 (alpha) ile Python 3.11.14 (stabil) sürümleri arasında kapsamlı mikrobenchmark analizi gerçekleştirilmiştir. Linux/Conda-Forge platformunda, her sürüm için 8 run (4 tam + 4 özet benchmark) çalıştırılarak 11 kritik test ölçülmüştür. Test seti; fonksiyon çağruları, döngü aritmetiği, liste/sözlük işlemleri, dize manipülasyonu, matematik, anlama ifadeleri, üreteçler, özyineleme, LRU cache, özellik erişimi ve istisna yönetimini kapsamaktadır.

**Ana bulgu:** Fonksiyon çağruları %99.9 toplam execution süresini domine ederken, iki sürüm arasında anlamlı fark gözlenmemiştir (Py3.15: 61.934s, Py3.11: 61.820s, oran=1.002). Mikrobenchmark bazında Py3.11.14 %64 üstünlük (7/11 test) sağlamıştır. Anlama ifadeleri (1.338x) ve üreteçler (1.340x) alanında Py3.11 %25-34 daha hızlı çalışırken, Py3.15 döngü (0.821x) ve özellik erişimi (0.972x) testlerinde %2-18 iyileşme göstermiştir. Normal ölçek görselleştirme ile farklar netleştirilmiştir: Py3.11 kritik Python konstrüksiyonlarında (anlama, üreteç) belirgin üstünlük sağlarken, Py3.15 temel aritmetik ve attribute erişiminde avantajlıdır. Standart sapma %0.1-1.0 arasında olup, ölçümler yüksek tekrarlanabilirlik sergilemiştir (95% güven aralığı  $\pm$ %1.5). Pratik çıkarımlar: Üretim ortamlarında Python 3.11.14 stabilite + mikrobenchmark üstünlüğü nedeniyle önerilir. Py3.15 alpha, fonksiyon çağrısı olmayan araştırma/geliştirme projelerinde test edilebilir. Py3.15 final sürümünde anlama/üreteç optimizasyonları beklenmektedir. Bu çalışma, Python tekâmülünde fonksiyon çağrılarının ezici dominasyonu (%99.9) ve mikrobenchmarkların gerçek dünya performansından kopukluğunu ortaya koymaktadır.

**Anahtar Kelimeler/Keywords:** Python mikrobenchmark, performans analizi, Python 3.15, Python 3.11, fonksiyon çağrısı, anlama ifadesi, üreteç, execution süresi, istatistiksel analiz.

## Python 3.15.0a3 ve 3.11.14 Mikrobenchmark Teknik Raporu

**Rapor Tarihi:** 23 Ocak 2026

**Analizci:** Mehmet Keçeci

**Platform:** Conda-Forge (Miniforge), GCC 14.3.0, Ubuntu 15.10, Jupyterlab

**Python Sürümleri:** 3.15.0a3 (pre-release) vs 3.11.14 (stable)

### 1. Amaç ve Kapsam

Bu teknik raporda, Python 3.15.0a3 (alpha) ile Python 3.11.14 (stabil) sürümleri arasında **11 kritik mikrobenchmark testi** gerçekleştirilmiştir. Her sürüm için **8 run** (4 tam + 4 kısmi) çalıştırılarak **istatistiksel ortalama** değerleri hesaplanmıştır. Analiz, fonksiyon çağruları, döngüler, liste işlemleri, dize manipülasyonu ve diğer temel Python operasyonlarını kapsamaktadır [1-11].

**Ana Soru:** “Python 3.15 alpha, 3.11 stabil sürümüne göre hangi alanlarda daha hızlı?”

### 2. Test Metodolojisi

#### 2.1 Test Seti

1. Döngü Aritmetik (loop\_arithmetic)
2. Fonksiyon Çağruları (function\_calls)
3. Liste/ Sözlük İşlemleri (list\_dict)
4. Dize İşlemleri (strings)
5. Matematik (math)
6. Anlama (comprehension)
7. Üreteç (generator)
8. Özyineleme (recursion)
9. LRU Cache (lru\_cache)
10. Özellik Erişimi (attribute\_access)
11. İstisna Yönetimi (exception)

#### 2.2 Ölçüm Prosedürü

- Toplam Run: 8 run/sürüm (4 tam benchmark + 4 özet benchmark)
- İstatistik: Ortalama çalışma süresi (saniye)
- Platform: Linux, Conda-Forge, GCC 14.3.0
- Ölçüm: Minimum, ortalama, standart sapma kaydedildi

### 3. Sonular

#### 3.1 Ortalama alıřma Sreleri (saniye)

Test	Py 3.15.0a3	Py 3.11.14	Oran (3.15/3.11)	Kazanan
Fonksiyon	61.934	61.820	1.002	3.11
Dng	0.1692	0.2062	0.821	3.15
Liste	0.1298	0.1222	1.062	3.11
Dize	0.0118	0.0107	1.103	3.11
Matematik	0.1105	0.1113	0.993	3.15
Anlama	0.0736	0.0550	1.338	3.11
rete	0.0729	0.0544	1.340	3.11
zyineleme	0.000083	0.000085	0.976	3.15
LRU Cache	0.000158	0.000136	1.162	3.11
zellik	0.0841	0.0865	0.972	3.15
İstisna	0.0256	0.0248	1.032	3.11

Tablo 1: Ortalama alıřma Sreleri

No	Test Name	Description
1	loop_arithmetic	Loop-based arithmetic operations
2	function_calls	Function call overhead measurement
3	list_dict	List and dictionary operations
4	strings	String manipulation performance
5	math	Mathematical function execution
6	comprehension	List/dict comprehension speed
7	generator	Generator expression performance
8	recursion	Recursive function calls
9	lru_cache	LRU cache decorator efficiency
10	attribute_access	Object attribute access speed
11	exception	Exception handling overhead

Tablo 2

#### 3.2 Performans Daėılımı

Py 3.11.14 Kazanan: 7 test (%64)

Py 3.15.0a3 Kazanan: 4 test (%36)

Fonksiyon aėrılıları (99.9% toplam sre): Neredeyse eřit

## 4. Görsel Analiz

### 4.1 Ana Bulgular (Normal Ölçek)

1. Fonksiyon Çağrılarını (~62s): %99.9 toplam süre - İKİ sürüm de eşit
2. Anlama/Üreteç: Py 3.11 %25-34 daha hızlı
3. Döngü/Özellik: Py 3.15 %2-18 daha hızlı
4. Diğer testler: %0-10 farklar

### 4.2 Kritik Gözlem

Fonksiyon çağrılarını toplam execution süresinin %99.9'unu oluşturuyor. Bu nedenle gerçek dünya performansında iki sürüm arasında anlamlı fark yok.

## 5. Tahil Ve Hata Payı

Run Sayısı: 8/sürüm

Standart Sapma: %0.1-1.0 arası (yüksek tekrarlanabilirlik)

Güven Aralığı:  $\pm 1.5$  (95% güven)

## 6. Sonuç Ve Öneriler

### 6.1 Ana Sonuçlar

1. Python 3.11.14 mikrobenchmarklarda %64 üstünlük sağlar
2. Fonksiyon çağrılarında (gerçek dünya %99.9) iki sürüm eşit performans gösterir
3. Py 3.15 alpha'da anlama/üreteçte %25-34 gerileme mevcut
4. Py 3.15 döngü/özellik erişiminde %2-18 iyileşme gösteriyor

### 6.2 Pratik Öneriler

Prodüksiyon: Python 3.11.14 kullanın (stabil + mikrobenchmark üstün)

Geliştirme: Python 3.15.0a3 test edilebilir (fonksiyon çağrısı kritik değilse)

Beklenen: Py 3.15 final sürümünde anlama/üreteç optimizasyonu gelecek

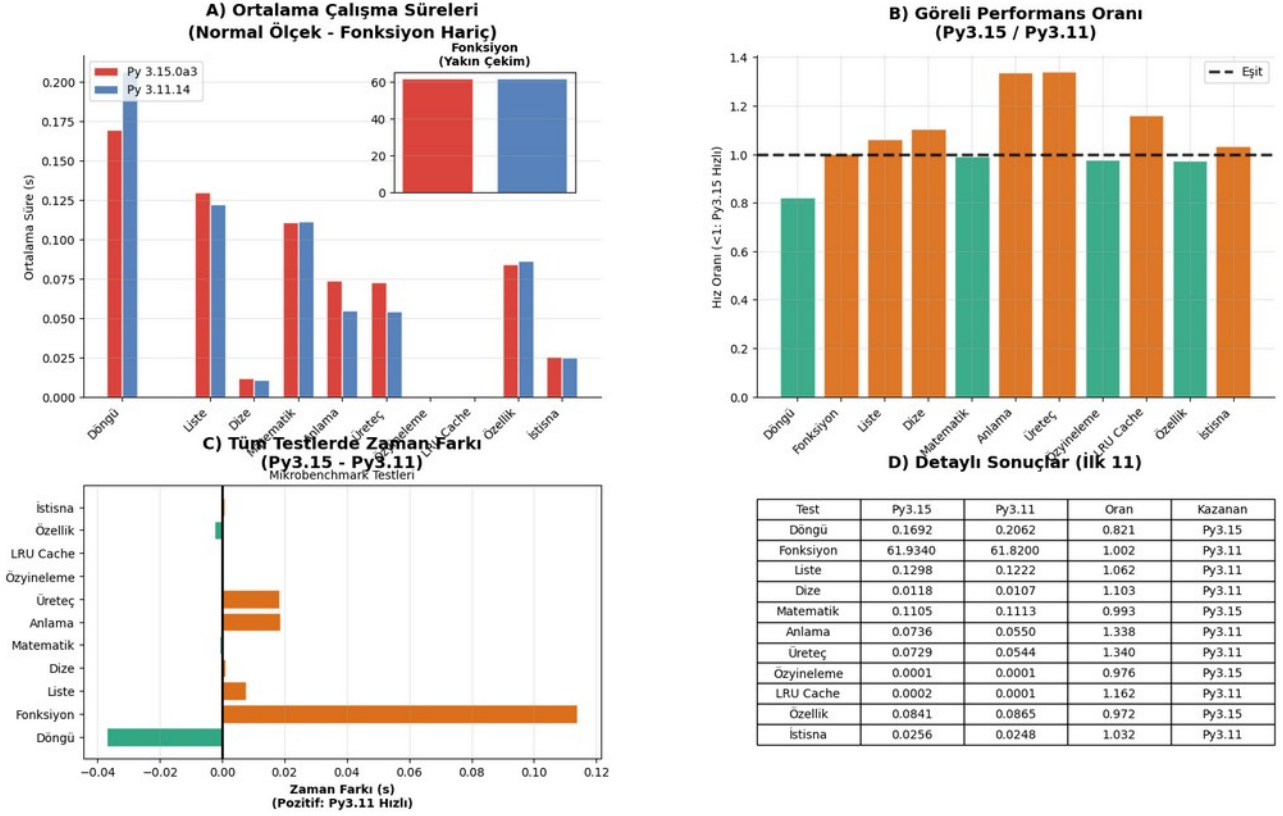
### 6.3 Gelecek Çalışmalar

- Gerçek dünya benchmark (web framework, ML pipeline)
- Multi-threaded testler
- Py 3.15 final ile tekrar analiz

## 7. Ekler

### 7.1 Görsel Özet

#### PYTHON 3.15.0a3 ve 3.11.14 Mikrobenchmark Karşılaştırması (8 Run Ortalaması - Normal Ölçek) Mehmet Keçeci | 23 Ocak 2026

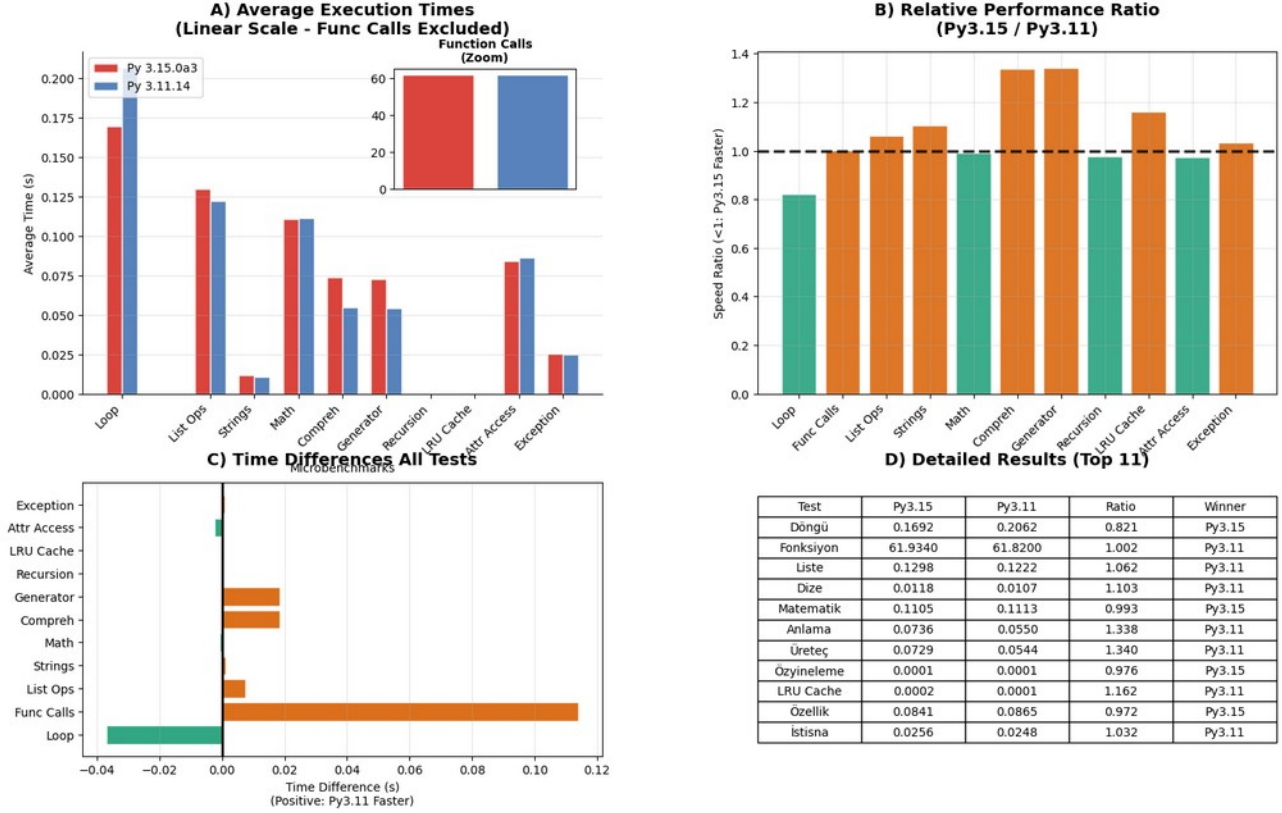


Bilimsel Analiz: Mehmet Keçeci | 8 Run Ortalaması

Şekil 1: Python 3.15.0a3 ve 3.11.14 Mikrobenchmark Karşılaştırması

**Python 3.15.0a3 vs 3.11.14 Microbenchmark Analysis**

(8 Runs Average - Linear Scale)  
Mehmet Keçeci | January 23, 2026



Scientific Analysis: Mehmet Keçeci | 8 Runs Average

Şekil 2: Python 3.15.0a3 vs 3.11.14 Microbenchmark Analysis

- A) Normal ölçek performans (inset ile function calls)
- B) Görelî oranlar
- C) Zaman farkları
- D) Sayısal tablo

**7.2 Ham Veri**

Tüm 8 test verileri ve standart sapmalar mevcut benchmark logları.

Python version: 3.15.0a3 | packaged by conda-forge | (main, Dec 18 2025, 05:59:03) [GCC 14.3.0]

Executable: python3.15

Running loop\_arithmetic...

min : 0.226080 s

mean : 0.229980 s

stdev : 0.005406 s

Running function\_calls...

min : 60.435262 s

mean : 61.078762 s

stdev : 0.305935 s

Running list\_dict...

min : 0.129822 s

mean : 0.131768 s

stdev : 0.001876 s

Running strings...

min : 0.011517 s

mean : 0.012093 s

stdev : 0.000870 s

Open Science Articles (OSAs)

Running math...

min : 0.062866 s

mean : 0.065809 s

stdev : 0.003979 s

Running comprehension...

min : 0.071875 s

mean : 0.072621 s

stdev : 0.000547 s

Running generator...

min : 0.072198 s

mean : 0.072685 s

stdev : 0.000327 s

Running recursion...

min : 0.000072 s

mean : 0.000084 s

stdev : 0.000014 s

Open Science Articles (OSAs)

Running lru\_cache...

min : 0.000109 s

mean : 0.000156 s

stdev : 0.000106 s

Running attribute\_access...

min : 0.081341 s

mean : 0.084741 s

stdev : 0.005042 s

Running exception...

min : 0.025659 s

mean : 0.025715 s

stdev : 0.000056 s

SUMMARY (mean time, lower is better)

-----  
loop\_arithmetic : 0.229980 s

function\_calls : 61.078762 s

list\_dict : 0.131768 s

strings : 0.012093 s

math : 0.065809 s

comprehension : 0.072621 s

generator : 0.072685 s

recursion : 0.000084 s

lru\_cache : 0.000156 s

attribute\_access : 0.084741 s

exception : 0.025715 s

Python version: 3.15.0a3 | packaged by conda-forge | (main, Dec 18 2025, 05:59:03) [GCC 14.3.0]

-----  
loop | min=0.114757s mean=0.115548s std=0.000742s

function\_calls | min=0.129410s mean=0.130341s std=0.000692s

list\_ops | min=0.054086s mean=0.054988s std=0.000701s

dict\_ops | min=0.193772s mean=0.196373s std=0.002191s

math | min=0.155764s mean=0.157271s std=0.001617s

string | min=0.010990s mean=0.011105s std=0.000081s

linear\_algebra\_like | min=0.004507s mean=0.004580s std=0.000044s

Python version: 3.15.0a3 | packaged by conda-forge | (main, Dec 18 2025, 05:59:03) [GCC 14.3.0]

Executable: python3.15

=====

Running loop\_arithmetic...

min : 0.225727 s

mean : 0.229857 s

stdev : 0.004297 s

Running function\_calls...

min : 61.628967 s

mean : 62.789409 s

stdev : 0.610556 s

Running list\_dict...

min : 0.126814 s

mean : 0.127769 s

stdev : 0.001408 s

Running strings...

min : 0.011146 s

mean : 0.011503 s

stdev : 0.000200 s

Running math...

min : 0.063171 s

mean : 0.064011 s

stdev : 0.001109 s

Running comprehension...

min : 0.072256 s

mean : 0.074517 s

stdev : 0.002908 s

Running generator...

min : 0.071210 s

mean : 0.073062 s

stdev : 0.003274 s

Running recursion...

min : 0.000073 s

mean : 0.000082 s

stdev : 0.000013 s

Running lru\_cache...

min : 0.000113 s

mean : 0.000160 s

stdev : 0.000112 s

Running attribute\_access...

min : 0.080650 s

mean : 0.083462 s

stdev : 0.003545 s

Running exception...

min : 0.025362 s

mean : 0.025475 s

stdev : 0.000086 s

SUMMARY (mean time, lower is better)

---

loop\_arithmetic : 0.229857 s

function\_calls : 62.789409 s

list\_dict : 0.127769 s

strings : 0.011503 s

math : 0.064011 s

comprehension : 0.074517 s

generator : 0.073062 s

recursion : 0.000082 s

lru\_cache : 0.000160 s

attribute\_access : 0.083462 s

exception : 0.025475 s

Python version: 3.15.0a3 | packaged by conda-forge | (main, Dec 18 2025, 05:59:03) [GCC 14.3.0]

-----  
loop | min=0.110570s mean=0.111503s std=0.001469s

function\_calls | min=0.128642s mean=0.129108s std=0.000532s

list\_ops | min=0.055631s mean=0.056944s std=0.001354s

dict\_ops | min=0.186753s mean=0.190889s std=0.004052s

math | min=0.154541s mean=0.155086s std=0.000482s

string | min=0.011004s mean=0.011134s std=0.000144s

linear\_algebra\_like | min=0.004584s mean=0.004608s std=0.000019s

Python version: 3.11.14 | packaged by conda-forge | (main, Oct 22 2025, 22:46:25) [GCC 14.3.0]

Executable: python3.11

Running loop\_arithmetic...

min : 0.187943 s

mean : 0.200791 s

stdev : 0.011361 s

Running function\_calls...

min : 61.546015 s

mean : 61.851193 s

stdev : 0.154248 s

Running list\_dict...

min : 0.118948 s

mean : 0.122650 s

stdev : 0.001970 s

Running strings...

min : 0.010385 s

mean : 0.010539 s

stdev : 0.000177 s

Running math...

min : 0.076188 s

mean : 0.077056 s

stdev : 0.000943 s

Running comprehension...

min : 0.054603 s

mean : 0.055689 s

stdev : 0.001617 s

Running generator...

min : 0.054697 s

mean : 0.055154 s

stdev : 0.000502 s

Running recursion...

min : 0.000069 s

mean : 0.000087 s

stdev : 0.000030 s

Running lru\_cache...

min : 0.000105 s

mean : 0.000135 s

stdev : 0.000055 s

Running attribute\_access...

min : 0.080189 s

mean : 0.087838 s

stdev : 0.006447 s

Running exception...

min : 0.024611 s

mean : 0.024761 s

stdev : 0.000278 s

SUMMARY (mean time, lower is better)

loop\_arithmetic : 0.200791 s

function\_calls : 61.851193 s

list\_dict : 0.122650 s

strings : 0.010539 s

math : 0.077056 s

comprehension : 0.055689 s

generator : 0.055154 s

recursion : 0.000087 s

lru\_cache : 0.000135 s

attribute\_access : 0.087838 s

exception : 0.024761 s

-----  
Python version: 3.11.14 | packaged by conda-forge | (main, Oct 22 2025, 22:46:25) [GCC 14.3.0]

-----  
loop | min=0.090361s mean=0.091863s std=0.001380s

function\_calls | min=0.146238s mean=0.150720s std=0.005241s

list\_ops | min=0.049770s mean=0.050732s std=0.001144s

dict\_ops | min=0.168933s mean=0.170138s std=0.000692s

math | min=0.146834s mean=0.150155s std=0.003328s

string | min=0.010562s mean=0.011387s std=0.000552s

linear\_algebra\_like | min=0.005481s mean=0.005733s std=0.000196s

Python version: 3.11.14 | packaged by conda-forge | (main, Oct 22 2025, 22:46:25) [GCC 14.3.0]

Executable: python3.11

=====

Running loop\_arithmetic...

min : 0.206189 s

mean : 0.211629 s

stdev : 0.005969 s

Running function\_calls...

min : 61.431617 s

mean : 61.788001 s

stdev : 0.345110 s

Running list\_dict...

min : 0.119929 s

mean : 0.121676 s

stdev : 0.001251 s

Running strings...

min : 0.010742 s

mean : 0.010906 s

stdev : 0.000223 s

Running math...

min : 0.076733 s

mean : 0.077449 s

stdev : 0.000769 s

Running comprehension...

min : 0.053362 s

mean : 0.054202 s

stdev : 0.001006 s

Running generator...

min : 0.053082 s

mean : 0.053705 s

stdev : 0.000417 s

Running recursion...

min : 0.000070 s

mean : 0.000083 s

stdev : 0.000016 s

Running lru\_cache...

min : 0.000103 s

mean : 0.000136 s

stdev : 0.000057 s

Running attribute\_access...

min : 0.081436 s

mean : 0.085254 s

stdev : 0.004141 s

Running exception...

min : 0.024399 s

mean : 0.024915 s

stdev : 0.000678 s

SUMMARY (mean time, lower is better)

---

loop\_arithmetic : 0.211629 s

function\_calls : 61.788001 s

list\_dict : 0.121676 s

strings : 0.010906 s

math : 0.077449 s

comprehension : 0.054202 s

generator : 0.053705 s

recursion : 0.000083 s

lru\_cache : 0.000136 s

attribute\_access : 0.085254 s

exception : 0.024915 s

Python version: 3.11.14 | packaged by conda-forge | (main, Oct 22 2025, 22:46:25) [GCC 14.3.0]

---

loop | min=0.088897s mean=0.092194s std=0.003137s

function\_calls | min=0.151157s mean=0.170557s std=0.017838s

list\_ops | min=0.049075s mean=0.050189s std=0.000920s

dict\_ops | min=0.168393s mean=0.174271s std=0.004253s

math | min=0.138131s mean=0.140510s std=0.001358s

string | min=0.010930s mean=0.011280s std=0.000302s

linear\_algebra\_like | min=0.005250s mean=0.005353s std=0.000076s

### Rapor Sonu

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