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JupyterLab Python 3 (ipykernel)

```
Printing 10,000 numbers using PYTHON (without loop)

import timeit

def print_numbers_without_loop():
    numbers_list = list(range(1, 10001))
    numbers_str = ', '.join(map(str, numbers_list))
    print(numbers_str)
```

```
if __name__ == "__main__":
    execution_time = timeit.timeit()
    print("Execution time for print
```

```

6, 9587, 9588, 9589, 9590, 9591, 9592, 9593, 9594, 9595, 9596, 9597, 9598, 9599, 9600, 9601, 9602, 9603, 9604, 9605, 9606, 9607, 9608, 9609, 9610, 961
1, 9612, 9613, 9614, 9615, 9616, 9617, 9618, 9619, 9620, 9621, 9622, 9623, 9624, 9625, 9626, 9627, 9628, 9629, 9630, 9631, 9632, 9633, 9634, 9635, 963
6, 9637, 9638, 9639, 9640, 9641, 9642, 9643, 9644, 9645, 9646, 9647, 9648, 9649, 9650, 9651, 9652, 9653, 9654, 9655, 9656, 9657, 9658, 9659, 9660, 966
1, 9662, 9663, 9664, 9665, 9666, 9667, 9668, 9669, 9670, 9671, 9672, 9673, 9674, 9675, 9676, 9677, 9678, 9679, 9680, 9681, 9682, 9683, 9684, 9685, 968
6, 9687, 9688, 9689, 9690, 9691, 9692, 9693, 9694, 9695, 9696, 9697, 9698, 9699, 9700, 9701, 9702, 9703, 9704, 9705, 9706, 9707, 9708, 9709, 9710, 971
1, 9712, 9713, 9714, 9715, 9716, 9717, 9718, 9719, 9720, 9721, 9722, 9723, 9724, 9725, 9726, 9727, 9728, 9729, 9730, 9731, 9732, 9733, 9734, 9735, 973
6, 9737, 9738, 9739, 9740, 9741, 9742, 9743, 9744, 9745, 9746, 9747, 9748, 9749, 9750, 9751, 9752, 9753, 9754, 9755, 9756, 9757, 9758, 9759, 9760, 976
1, 9762, 9763, 9764, 9765, 9766, 9767, 9768, 9769, 9770, 9771, 9772, 9773, 9774, 9775, 9776, 9777, 9778, 9779, 9780, 9781, 9782, 9783, 9784, 9785, 978
6, 9787, 9788, 9789, 9790, 9791, 9792, 9793, 9794, 9795, 9796, 9797, 9798, 9799, 9800, 9801, 9802, 9803, 9804, 9805, 9806, 9807, 9808, 9809, 9810, 981
1, 9812, 9813, 9814, 9815, 9816, 9817, 9818, 9819, 9820, 9821, 9822, 9823, 9824, 9825, 9826, 9827, 9828, 9829, 9830, 9831, 9832, 9833, 9834, 9835, 983
6, 9837, 9838, 9839, 9840, 9841, 9842, 9843, 9844, 9845, 9846, 9847, 9848, 9849, 9850, 9851, 9852, 9853, 9854, 9855, 9856, 9857, 9858, 9859, 9860, 986
1, 9862, 9863, 9864, 9865, 9866, 9867, 9868, 9869, 9870, 9871, 9872, 9873, 9874, 9875, 9876, 9877, 9878, 9879, 9880, 9881, 9882, 9883, 9884, 9885, 988
6, 9887, 9888, 9889, 9890, 9891, 9892, 9893, 9894, 9895, 9896, 9897, 9898, 9899, 9900, 9901, 9902, 9903, 9904, 9905, 9906, 9907, 9908, 9909, 9910, 991
1, 9912, 9913, 9914, 9915, 9916, 9917, 9918, 9919, 9920, 9921, 9922, 9923, 9924, 9925, 9926, 9927, 9928, 9929, 9930, 9931, 9932, 9933, 9934, 9935, 993
6, 9937, 9938, 9939, 9940, 9941, 9942, 9943, 9944, 9945, 9946, 9947, 9948, 9949, 9950, 9951, 9952, 9953, 9954, 9955, 9956, 9957, 9958, 9959, 9960, 996
1, 9962, 9963, 9964, 9965, 9966, 9967, 9968, 9969, 9970, 9971, 9972, 9973, 9974, 9975, 9976, 9977, 9978, 9979, 9980, 9981, 9982, 9983, 9984, 9985, 998
6, 9987, 9988, 9989, 9990, 9991, 9992, 9993, 9994, 9995, 9996, 9997, 9998, 9999, 10000

Execution time for print numbers without loop(): 0.002849 seconds

```

Printing 10,000 numbers using PYTHON (for loop)

```
[43]: import timeit
def print_using_for_loop():
    for i in range(10000):
        print(i, end=' ')
if __name__ == "__main__":
    execution_time = timeit.timeit(print_using_for_loop, number=1)
    print("\nExecution time for print_using_for_loop(): {:.6f} seconds".format(execution_time))
```

512 9513 9514 9515 9516 9517 9518 9519 9520 9521 9522 9523 9524 9525 9526 9527 9528 9529 9530 9531 9532 9533 9534 9535 9536 9537 9538 9539 9540 9541 95
42 9543 9544 9545 9546 9547 9548 9549 9550 9551 9552 9553 9554 9555 9556 9557 9558 9559 9560 9561 9562 9563 9564 9565 9566 9567 9568 9569 9570 9571 957
2 9573 9574 9575 9576 9577 9578 9579 9580 9581 9582 9583 9584 9585 9586 9587 9588 9589 9590 9591 9592 9593 9594 9595 9596 9597 9598 9599 9600 9601 9602
9603 9604 9605 9606 9607 9608 9609 9610 9611 9612 9613 9614 9615 9616 9617 9618 9619 9620 9621 9622 9623 9624 9625 9626 9627 9628 9629 9630 9631 9632 9
633 9634 9635 9636 9637 9638 9639 9640 9641 9642 9643 9644 9645 9646 9647 9648 9649 9650 9651 9652 9653 9654 9655 9656 9657 9658 9659 9660 9661 9662 96
63 9664 9665 9666 9667 9668 9669 9670 9671 9672 9673 9674 9675 9676 9677 9678 9679 9680 9681 9682 9683 9684 9685 9686 9687 9688 9689 9690 9691 9692 969
3 9694 9695 9696 9697 9698 9699 9700 9701 9702 9703 9704 9705 9706 9707 9708 9709 9710 9711 9712 9713 9714 9715 9716 9717 9718 9719 9720 9721 9722 9723
9724 9725 9726 9727 9728 9729 9730 9731 9732 9733 9734 9735 9736 9737 9738 9739 9740 9741 9742 9743 9744 9745 9746 9747 9748 9749 9750 9751 9752 9753 9
754 9755 9756 9757 9758 9759 9760 9761 9762 9763 9764 9765 9766 9767 9768 9769 9770 9771 9772 9773 9774 9775 9776 9777 9778 9779 9780 9781 9782 9783 97
84 9785 9786 9787 9788 9789 9790 9791 9792 9793 9794 9795 9796 9797 9798 9799 9800 9801 9802 9803 9804 9805 9806 9807 9808 9809 9810 9811 9812 9813 981
4 9815 9816 9817 9818 9819 9820 9821 9822 9823 9824 9825 9826 9827 9828 9829 9830 9831 9832 9833 9834 9835 9836 9837 9838 9839 9840 9841 9842 9843 9844
9845 9846 9847 9848 9849 9850 9851 9852 9853 9854 9855 9856 9857 9858 9859 9860 9861 9862 9863 9864 9865 9866 9867 9868 9869 9870 9871 9872 9873 9874 9
875 9876 9877 9878 9879 9880 9881 9882 9883 9884 9885 9886 9887 9888 9889 9890 9891 9892 9893 9894 9895 9896 9897 9898 9899 9900 9901 9902 9903 9904 99
05 9906 9907 9908 9909 9910 9911 9912 9913 9914 9915 9916 9917 9918 9919 9920 9921 9922 9923 9924 9925 9926 9927 9928 9929 9930 9931 9932 9933 9934 993
5 9936 9937 9938 9939 9940 9941 9942 9943 9944 9945 9946 9947 9948 9949 9950 9951 9952 9953 9954 9955 9956 9957 9958 9959 9960 9961 9962 9963 9964 9965
9966 9967 9968 9969 9970 9971 9972 9973 9974 9975 9976 9977 9978 9979 9980 9981 9982 9983 9984 9985 9986 9987 9988 9989 9990 9991 9992 9993 9994 9995 9
996 9997 9998 9999

Execution time for print_using_for_loop(): 0.022551 seconds

A set of small, semi-transparent icons representing different file types and operations, such as code, images, and search.

JupyterLab Python 3 (ipykernel)

Printing 10,000 numbers using PYTHON (numpy)

[]: !pip install numpy

```
[49]: import numpy as np
import timeit

def print_numbers_using_numpy():
    numbers_array = np.arange(1, 10001)
    print(numbers_array)

if __name__ == "__main__":
    execution_time = timeit.timeit(print_numbers_using_numpy, number=1)
    print("Execution time for print_numbers_using_numpy(): {:.6f} seconds".format(execution_time))
```

A set of icons used to manage code cells, including a plus sign, arrows for up and down, and other symbols.

```
[ 1   2   3 ... 9998 9999 10000]
Execution time for print_numbers_using_numpy(): 0.000297 seconds
```



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JupyterLab  Python 3 (ipykernel) 

Printing 10,000 numbers using CYTHON

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```
2.4/2.8 MB 977.0 kB/s eta 0:00:01
----- 2.5/2.8 MB 964.9 kB/s eta 0:00:01
----- 2.5/2.8 MB 973.2 kB/s eta 0:00:01
----- 2.6/2.8 MB 973.2 kB/s eta 0:00:01
----- 2.6/2.8 MB 973.4 kB/s eta 0:00:01
----- 2.7/2.8 MB 996.3 kB/s eta 0:00:01
----- 2.8/2.8 MB 997.8 kB/s eta 0:00:00
```

```
Installing collected packages: cython
Successfully installed cython-3.0.0
```

```
[notice] A new release of pip is available: 23.1.2 -> 23.2.1
[notice] To update, run: python.exe -m pip install --upgrade pip
```

```
[13]: import os
```

```
current_directory = os.getcwd()
print("Current Directory:", current_directory)
```

```
Current Directory: C:\Users\rashi
```

```
[2]: def print_number_using_cython():
    for i in range(10001):
        print(i, end=' ')
```

```
[3]: %%writefile print_number_using_cython.pyx
def print_number_using_cython():
    for i in range(10001):
        print(i, end=' ')
```

```
Writing print_number_using_cython.pyx
```



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JupyterLab  Python 3 (ipykernel) 

```
[5]: %%writefile setup.py
from setuptools import setup
from Cython.Build import cythonize

ext_modules = cythonize("print_number_using_cython.pyx")

setup(
    ext_modules=ext_modules
)
```

Writing setup.py

```
[6]: !python setup.py build_ext --inplace
```

```
running build_ext
building 'print_number_using_cython' extension
"C:\Program Files (x86)\Microsoft Visual Studio\2022\BuildTools\VC\Tools\MSVC\14.36.32532\bin\HostX86\x64\cl.exe" /c /nologo /O2 /W3 /GL /DNDEBUG /MD "-I C:\Program Files\Python311\include" "-IC:\Program Files\Python311\Include" "-IC:\Program Files (x86)\Microsoft Visual Studio\2022\BuildTools\VC\Tools\MSVC\14.36.32532\include" "-IC:\Program Files (x86)\Microsoft Visual Studio\2022\BuildTools\VC\Auxiliary\VS\include" "-IC:\Program Files (x86)\Windows Kits\10\include\10.0.22000.0\ucrt" "-IC:\Program Files (x86)\Windows Kits\10\include\10.0.22000.0\um" "-IC:\Program Files (x86)\Windows Kits\10\include\10.0.22000.0\shared" "-IC:\Program Files (x86)\Windows Kits\10\include\10.0.22000.0\winrt" "-IC:\Program Files (x86)\Windows Kits\10\include\10.0.22000.0\cppwinrt" /Tcprint_number_using_cython.c /Fobuild\temp.win-amd64-cpython-311\Release\print_number_using_cython.obj
print_number_using_cython.c
"C:\Program Files (x86)\Microsoft Visual Studio\2022\BuildTools\VC\Tools\MSVC\14.36.32532\bin\HostX86\x64\link.exe" /nologo /INCREMENTAL:NO /LTCG /DLL /MANIFEST:EMBED,ID=2 /MANIFESTUAC:NO "/LIBPATH:C:\Program Files\Python311\libs" "/LIBPATH:C:\Program Files\Python311" "/LIBPATH:C:\Program Files\Python311\PCbuild\amd64" "/LIBPATH:C:\Program Files (x86)\Microsoft Visual Studio\2022\BuildTools\VC\Tools\MSVC\14.36.32532\lib\x64" "/LIBPATH:C:\Program Files (x86)\Windows Kits\10\lib\10.0.22000.0\ucrt\x64" "/LIBPATH:C:\Program Files (x86)\Windows Kits\10\lib\10.0.22000.0\um\x64" /EXPORT:PyInit_print_number_using_cython build\temp.win-amd64-cpython-311\Release\print_number_using_cython.obj /OUT:build\lib.win-amd64-cpython-311\print_number_using_cython.cp311-win_amd64.pyd /IMPLIB:build\temp.win-amd64-cpython-311\Release\print_number_using_cython.cp311-win_amd64.lib
```

```
ease\print_number_using_cython.cp311-win_amd64.exp
Generating code
Finished generating code
copying build\lib.win-amd64-cpython-311\print_number_using_cython.cp311-win_amd64.pyd ->
```

```
[11]: from print_number_using_cython import print_number_using_cython
import timeit

if __name__ == "__main__":
    execution_time = timeit.timeit(print_number_using_cython, number=1)
    print("Execution time for print_number_using_cython(): {:.6f} seconds".format(execution_time))
```

```
1 9482 9483 9484 9485 9486 9487 9488 9489 9490 9491 9492 9493 9494 9495 9496 9497 9498 9499 9500 9501 9502 9503 9504 9505 9506 9507 9508 9509 9510 9511 9
512 9513 9514 9515 9516 9517 9518 9519 9520 9521 9522 9523 9524 9525 9526 9527 9528 9529 9530 9531 9532 9533 9534 9535 9536 9537 9538 9539 9540 9541 95
42 9543 9544 9545 9546 9547 9548 9549 9550 9551 9552 9553 9554 9555 9556 9557 9558 9559 9560 9561 9562 9563 9564 9565 9566 9567 9568 9569 9569 9570 9571 957
2 9573 9574 9575 9576 9577 9578 9579 9580 9581 9582 9583 9584 9585 9586 9587 9588 9589 9590 9591 9592 9593 9594 9595 9596 9597 9598 9599 9600 9601 9602
9603 9604 9605 9606 9607 9608 9609 9610 9611 9612 9613 9614 9615 9616 9617 9618 9619 9620 9621 9622 9623 9624 9625 9626 9627 9628 9629 9630 9631 9632 9
633 9634 9635 9636 9637 9638 9639 9640 9641 9642 9643 9644 9645 9646 9647 9648 9649 9650 9651 9652 9653 9654 9655 9656 9657 9658 9659 9660 9661 9662 96
63 9664 9665 9666 9667 9668 9669 9670 9671 9672 9673 9674 9675 9676 9677 9678 9679 9680 9681 9682 9683 9684 9685 9686 9687 9688 9689 9690 9691 9692 969
3 9694 9695 9696 9697 9698 9699 9700 9701 9702 9703 9704 9705 9706 9707 9708 9709 9710 9711 9712 9713 9714 9715 9716 9717 9718 9719 9720 9721 9722 9723
9724 9725 9726 9727 9728 9729 9730 9731 9732 9733 9734 9735 9736 9737 9738 9739 9740 9741 9742 9743 9744 9745 9746 9747 9748 9749 9750 9751 9752 9753 9
754 9755 9756 9757 9758 9759 9760 9761 9762 9763 9764 9765 9766 9767 9768 9769 9770 9771 9772 9773 9774 9775 9776 9777 9778 9779 9780 9781 9782 9783 97
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05 9906 9907 9908 9909 9910 9911 9912 9913 9914 9915 9916 9917 9918 9919 9920 9921 9922 9923 9924 9925 9926 9927 9928 9929 9930 9931 9932 9933 9934 993
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9966 9967 9968 9969 9970 9971 9972 9973 9974 9975 9976 9977 9978 9979 9980 9981 9982 9983 9984 9985 9986 9987 9988 9989 9990 9991 9992 9993 9994 9995 9
996 9997 9998 9999 10000 Execution time for print_number_using_cython(): 0.025426 seconds
```

C:\Users\rashi\AppData\Local\Programs\Julia-1.9.2\bin\julia.exe

```
[81def892] + VersionParsing v1.3.0
[c2297ded] + ZMQ v1.2.2
[8f1865be] + ZeroMQ_jll v4.3.4+0
[a9144af2] + libsodium_jll v1.0.20+0
[0dad84c5] + ArgTools v1.1.1
[56f22d72] + Artifacts
[2a0f44e3] + Base64
[ade2ca70] + Dates
[7b1f6079] + FileWatching
[b27032c2] + LibCURL v0.6.3
[76f85450] + LibGit2
[8f399da3] + Libdl
[56ddb016] + Logging
[d6f4376e] + Markdown
[a63ad114] + Mmap
[ca575930] + NetworkOptions v1.2.0
[44cf95a] + Pkg v1.9.2
[de0858da] + Printf
[3fa0cd96] + REPL
[9a3f8284] + Random
[ea8e919c] + SHA v0.7.0
[9e88b42a] + Serialization
[6462fe0b] + Sockets
[fa267f1f] + TOML v1.0.3
[a4e569a6] + Tar v1.10.0
[8dfed614] + Test
[cf7118a7] + UUIDs
[4ec0a83e] + Unicode
[deac9b47] + LibCURL_jll v7.84.0+0
[29816b5a] + LibSSH2_jll v1.10.2+0
[c8ffd9c3] + MbedTLS_jll v2.28.2+0
[14a3606d] + MozillaCACerts_jll v2022.10.11
[83775a58] + Zlib_jll v1.2.13+0
[8e850ede] + nghttp2_jll v1.48.0+0
[3f19e933] + p7zip_jll v17.4.0+0
Building Conda → `C:\Users\rashi\.julia\scratchspaces\44cf95a-1eb2-52ea-b672-e2afdf69b78f\8c86e48c0db1564a1d49548d3515ced5d604c408\build.log`
Building IJulia → `C:\Users\rashi\.julia\scratchspaces\44cf95a-1eb2-52ea-b672-e2afdf69b78f\47ac8cc196b81001a711f4b2c12c97372338f00c\build.log`
13 dependencies successfully precompiled in 38 seconds. 3 already precompiled.
```



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JupyterLab Julia 1.9.2

```
[3]: function print_numbers()
        for i in 0:10000
            print(i, " ")
        end
    end
```

```
@time print_numbers()
```

```

9482 9483 9484 9485 9486 9487 9488 9489 9490 9491 9492 9493 9494 9495 9496 9497 9498 9499 9500 9501 9502 9503 9504 9505 9506 9507 9508 9509 9510 9511 9
512 9513 9514 9515 9516 9517 9518 9519 9520 9521 9522 9523 9524 9525 9526 9527 9528 9529 9530 9531 9532 9533 9534 9535 9536 9537 9538 9539 9540 9541 95
42 9543 9544 9545 9546 9547 9548 9549 9550 9551 9552 9553 9554 9555 9556 9557 9558 9559 9560 9561 9562 9563 9564 9565 9566 9567 9568 9569 9570 9571 957
2 9573 9574 9575 9576 9577 9578 9579 9580 9581 9582 9583 9584 9585 9586 9587 9588 9589 9590 9591 9592 9593 9594 9595 9596 9597 9598 9599 9600 9601 9602
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9845 9846 9847 9848 9849 9850 9851 9852 9853 9854 9855 9856 9857 9858 9859 9860 9861 9862 9863 9864 9865 9866 9867 9868 9869 9870 9871 9872 9873 9874 9
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9966 9967 9968 9969 9970 9971 9972 9973 9974 9975 9976 9977 9978 9979 9980 9981 9982 9983 9984 9985 9986 9987 9988 9989 9990 9991 9992 9993 9994 9995 9
996 9997 9998 9999 10000 0.682496 seconds (195.50 k allocations: 5,880 MiB)

```