

Genome Assembly using NanoDJ Notebooks in Cyverse

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Outline of Today's Focus Forum

- Next generation sequencing steps
- Oxford nanopore technology sequencing
- Assembly process
- NanoDJ bacteria genome assembly demo

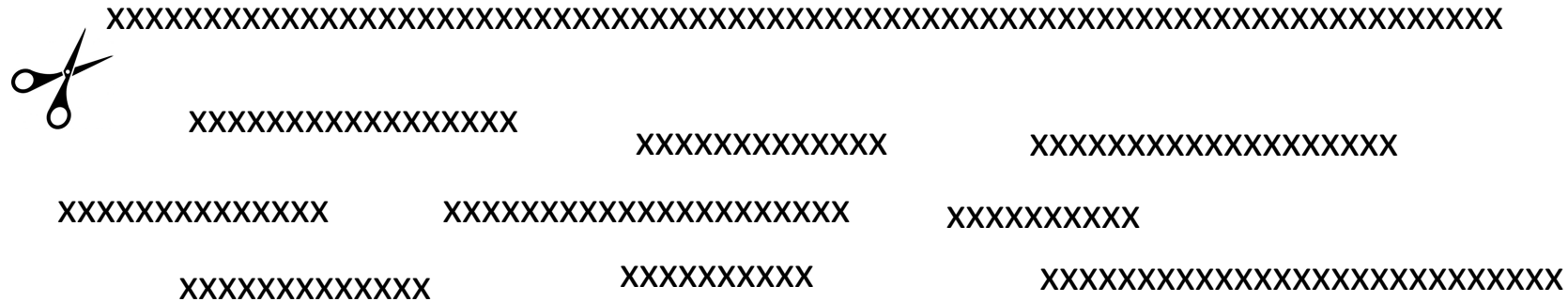
*Due to time constraint and the complexity of the assembly process, we will not perform the assembly of a complete genome in real time.



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Main steps of Next Generation Sequencing



Fragmentation



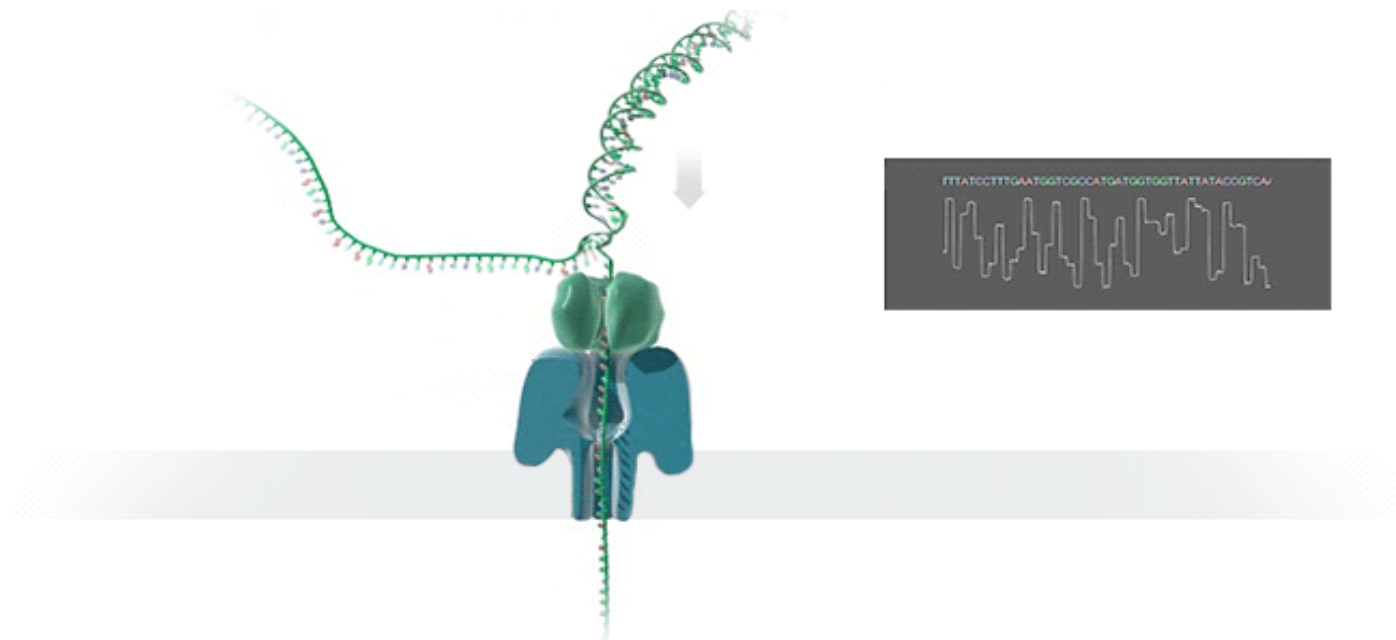
Sequencing

Assembly

Alignment

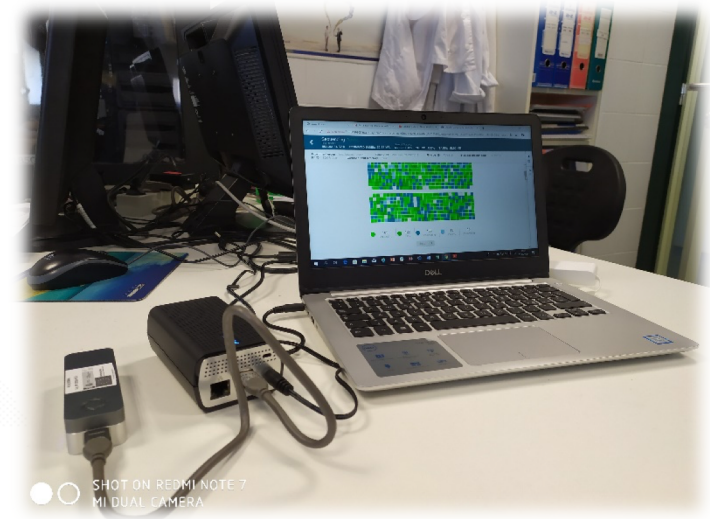
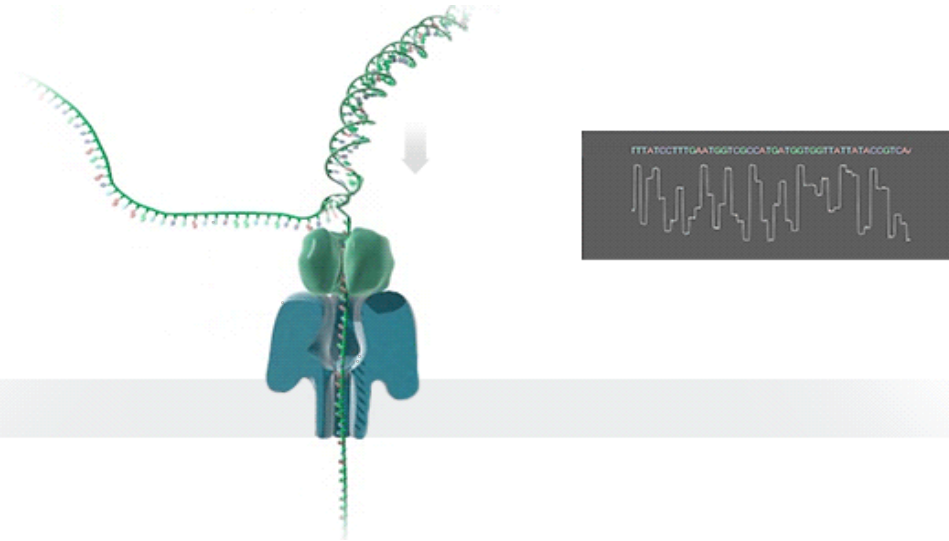
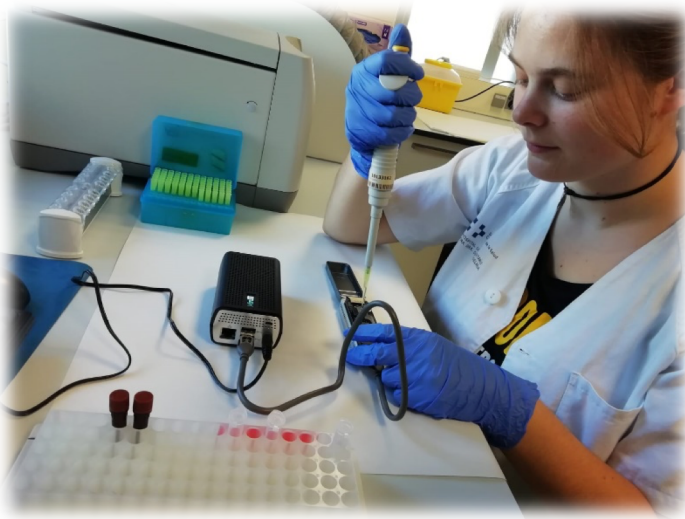
De Novo

Nanopore sequencing



Nanopore sequencing

- Portable
- Long reads
- Sequencing in real time
- Assemble complex genome



Some assemblers

- Shorts reads: Velvet, SPAdes
- Long reads: Canu, Flye, Miniasm
- Short and long reads: Unicycler, MASurCa



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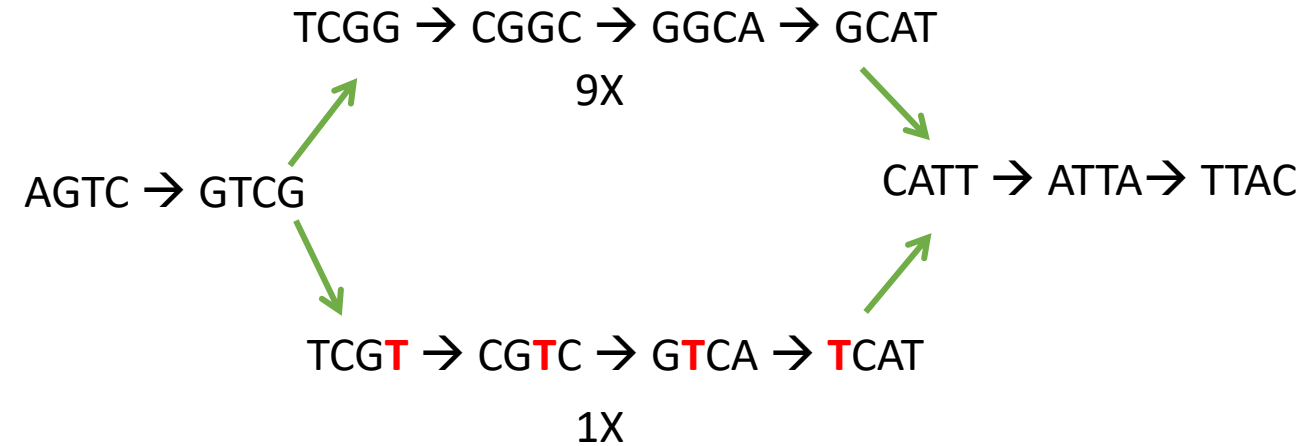
Overlap Layout Consensus assembly (OLC)

AGCGATGAGCGTGACGAA
AGCGATGANC GTGACGAA
ATGAGCGTGACGAAGTT
GTGACGAAGTTGACCAG
AAGTTGACCNGGCA
CCAGGCAGTGAGC
CAGGCAGTGAGCT
CAGTGAGCTAGAC
AGCTAGACTCGAC



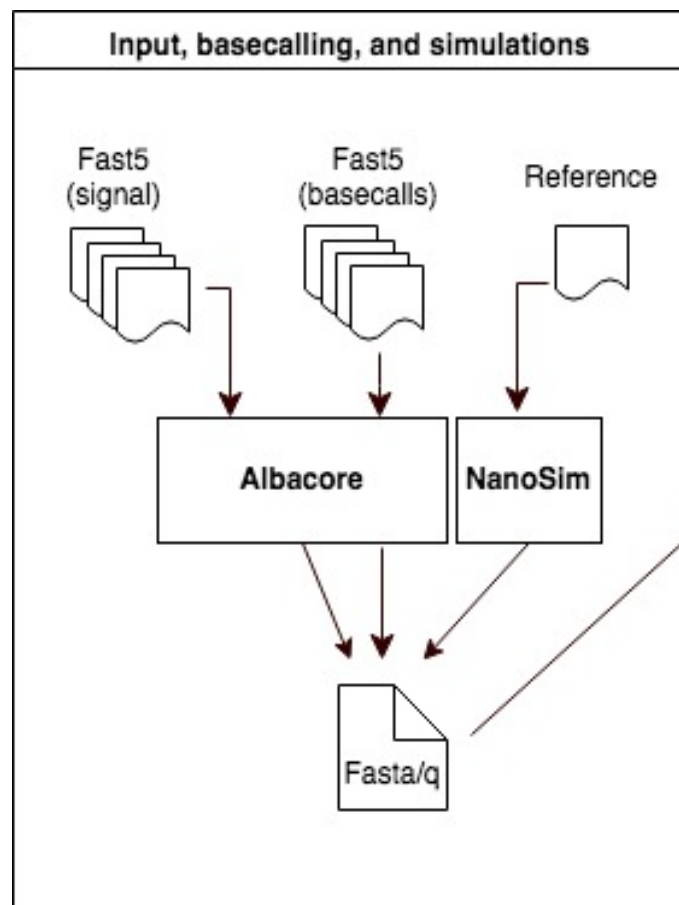
AGCGATGAGCGTGACGAAGTTGACCAGGCAGTGAGCTAGACTCGAC

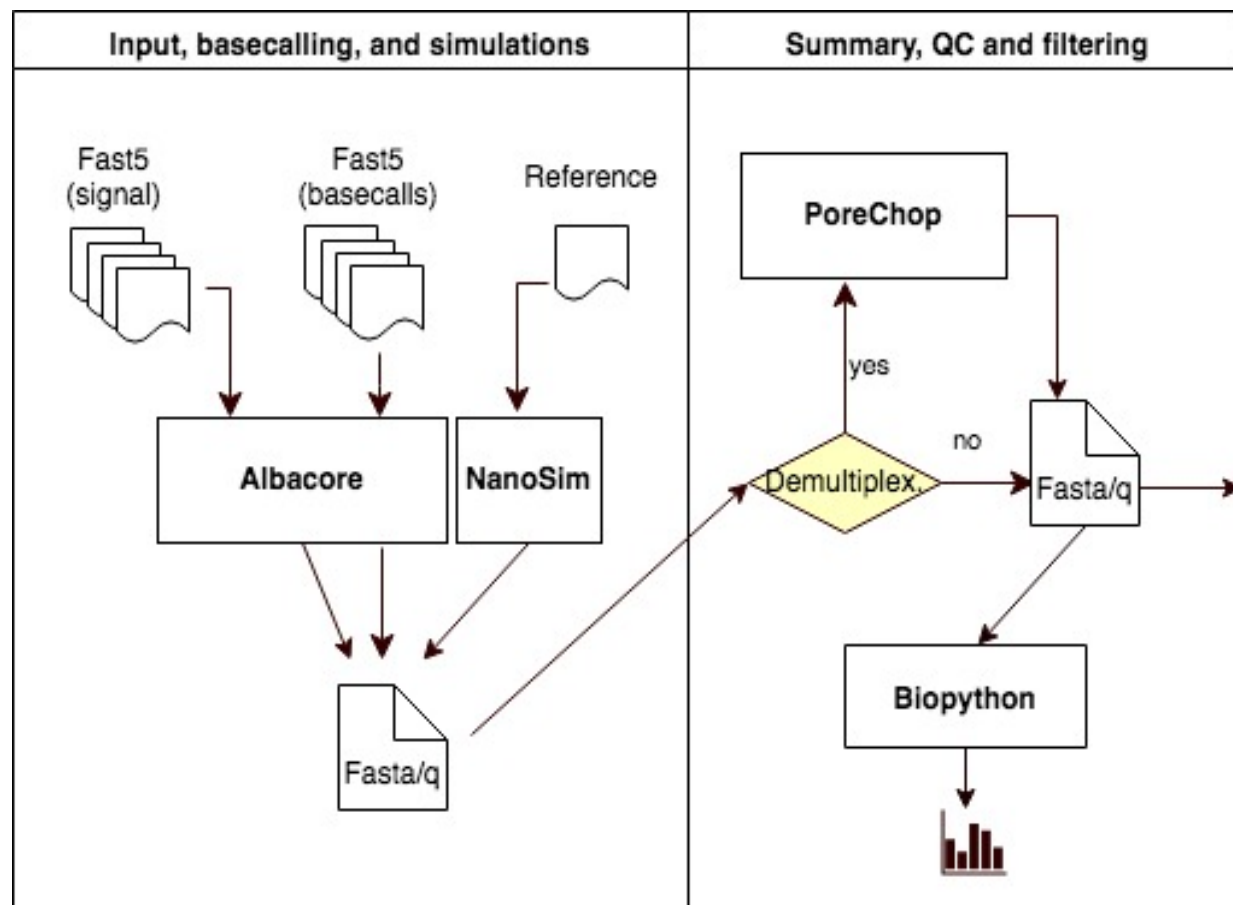
De Bruijn graph (DBG)

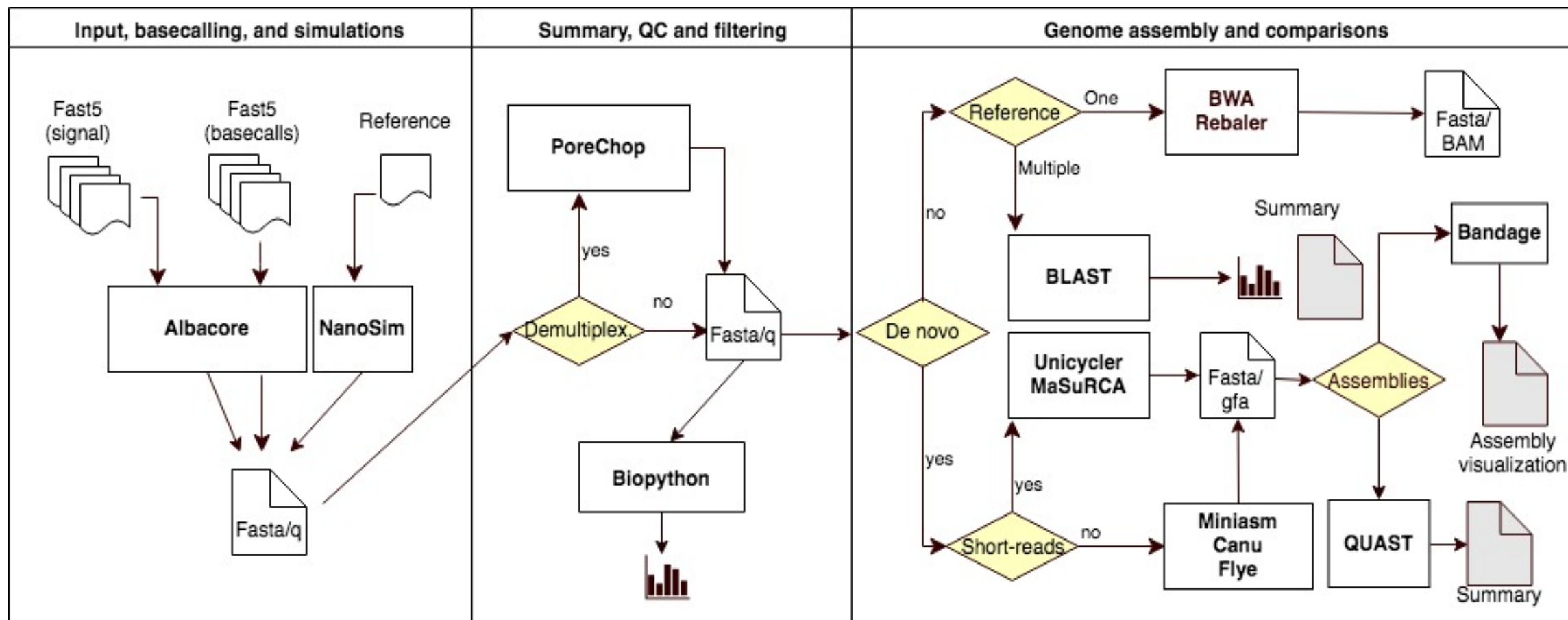


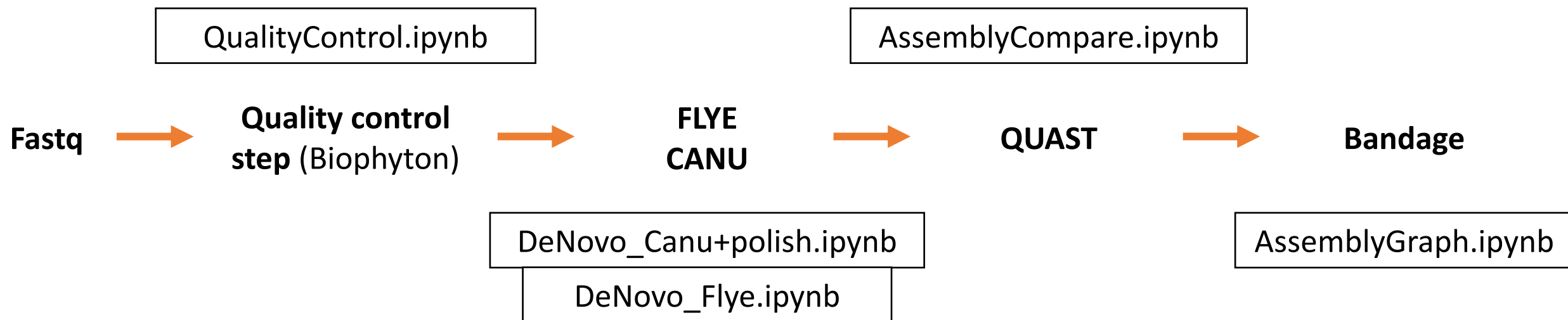


<https://github.com/genomicsITER/NanoDJ>









Genome assembly demo



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Things to keep in mind

- The assembly depends on different factors such as the nature of the sequenced organism and the run performance.
- The type of assembler depends on the objective of your study and the genome you want to assemble.
- Assembly of larger genomes requires greater computational performance and longer execution time.
- We are testing new tools to incorporate in NanoDJ.



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Thank you for attending



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