## Cloud Computing Report Assignment 3 Group B

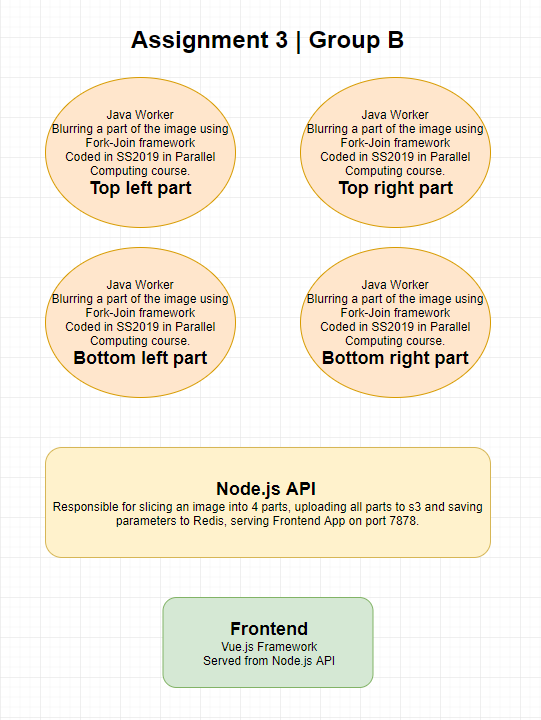


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| **Datum:** | 26.12.2019 |

### Image Blurring Program

Blurring images pixel by pixel using simple java program from the course “Parallel Computing (SS2019)” using Fork-Join framework. So, code belongs to student (01646292). When using the program, please choose big image (high resolution). Image will be sliced (by Node.js program) into 4 equal parts and each part will be forwarded to separate worker (already mentioned Java FK blurring) for processing.

The image in the end will have the cross in the middle, because the algorithm colors the border in black. But however, that’s not the topic of the assignment and we hope that won’t play the role in rating.

In order to test our program, please visit:  
[ec2-18-184-231-193.eu-central-1.compute.amazonaws.com:7878  
  
**Architecture Overview**As described in the forum, inter-parallelization part is done inside of each java worker, and intra-parallelization part is done by slicing image into 4 equal parts and forwarding each part to one java worker for processing in parallel.](http://ec2-18-184-231-193.eu-central-1.compute.amazonaws.com:7878Architecture%20Overview)   


**Result of the program**Original

Blurred **Programming**We have used 2 different programming languages in order to complete our planed project. First is **Node.js API** which serves and talks to the basic Frontend Application (index.html) which uses **Vue.js frontend** framework to make DOM updates easier, and the second one is **Java Spring Boot** Server which is using the core parallel functions from “Parallel Computing” Course from SS2019.  
  
Node.js API Repository: <https://github.com/mihajlon97/cc-upload-api>

Java Worker Repository: <https://github.com/mihajlon97/cc-java-blurr>

**AWS Overview**As the topic of the assignment says, this was the main part of the assignment, but we lost, probably as all students, most of our time on implementation our idea respecting inter and intra parallelization.  
However we used quiet interesting services from AWS and we learned a lot by doing this assignment and configuring our working environment.  
  
Account to login – Credit Card is added there, so be careful with what you do!  
We already exceed Free Tier Limit for S3 Service while developing and we are charged to pay some small amount but that’s ok😉  
URL: <https://signin.aws.amazon.com/>

Email: [a01646292@unet.univie.ac.at](mailto:a01646292@unet.univie.ac.at)  
Password: Mikimozaik1997!  
  
**AWS Services**S3 – As already mentioned, we are using S3 bucket for uploading original, blurred (completed) image and all 4 part for each worker, both original and blurred.

AWS Lambda (Serverless) – As the most challenging part of Cloud Computing, we wanted to try Lambda functions and we wrote interesting one in Node.js. The code is inside “lambda” folder inside cc-upload-api repository.  
This function will be triggered every time some image is uploaded inside S3 bucket. Then, if there are all 4 blurred images, it will send POST request to Node.js API in order to combine all 4 parts into one big image. Awesome, isn’t it? 😊  
  
EC2 Instance – Linux machine where Node.js API and Java Workers are running.  
Amazon EKS – It would be nice to connect gained knowledge from Assignment 1-2 and Kubernetes, but this is paid service and no free tier available.  
  
ElastiCache– Redis Key-Value Pair Database. Used for storing process ids (blurring id), URLs of original and parts of the photos on S3 bucket, and one Boolean flag for completion.

Cloud Watch – Used for basic usage notifications and billing limitations.

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Conclusion

The Assignment 3 was very interesting for all of us, specially because it was something real, scalable and professional. We worked well as a team and happy that we learned a lot from each other. If we got something great and useful from this course, that is AWS know-how. Many thanks for such great assignments so far😊