

Sharing my experience from the NIMA paper publication



Cheolhun Kim
Hanyang University
Korea

- ECLTRG Slow Control Paper (IEEE)
 - Internal Editing Process (Lab level)
 - Tools
 - Microsoft Office Word
 - Rejected
 - Email
 - cf) Dr. Lee Insoo's paper published

- TRG Slow Control System Paper (NIMA)
 - Tools
 - Overleaf (latex)
 - Grammarly
 - Internal Collaboration Editing Process (DAQ/SLC group, TRG group)
 - ArXiv Upload
 - Belle II notes
 - Accepted, Published
 - Congratulations Messages
 - Award

NIMA Paper



Contents lists available at ScienceDirect

Nuclear Inst. and Methods in Physics Research, A

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Trigger slow control system of the Belle II experiment

C.-H. Kim^{a,*}, Y. Unno^a, H.E. Cho^a, B.G. Cheon^{b,c}, S.H. Kim^{b,a}, I.S. Lee^{b,a}, E.-J. Jang^c,
S.-K. Choi^c, Y.J. Kim^d, J.K. Ahn^d, M. Remnev^{e,f}, A. Kuzmin^{e,f}, T. Koga^g, Y.-T. Lai^g, Y. Iwasaki^h,
H. Nakazawa^h, D. Liventsev^{i,j}, M. Nakao^{k,l}, S. Yamada^g, R. Itoh^g, T. Konno^k, S.-H. Park^{h,l},
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ARTICLE INFO

Keywords:

Slow control system

Trigger

Data acquisition

ABSTRACT

The Belle II experiment at the SuperKEKB e^+e^- collider in KEK, Japan, started physics data-taking with a complete detector from early 2019. An online trigger system is indispensable for the Belle II experiment to reduce the beam background events associated with high electron and positron beam currents without sacrificing the target physics-oriented events. During the Belle II operation upon beam collision, the trigger system must be consistently controlled and its status must be carefully monitored in the process of data acquisition against unexpected situations. For this purpose, we have developed a slow control system for the newly developed Belle II trigger system based on the custom-made Belle II DAQ/slow control package. Around seventy thousand configuration parameters are saved in the Belle II central database server for every run when a run starts and stops. These parameters play an essential role in offline validation of the quality of runs. Around three thousand real-time variables are stored in the Belle II main archiving server, and the trend of some of these variables are regularly used for online and offline monitoring purposes. Various operator interface tools have been prepared and used. When the configuration parameters are not correctly applied, or some of the processes are unexpectedly terminated, the slow control system detects it, stops the data-taking process, and generates an alarm. In this article, we report how we constructed the Belle II trigger slow control system, and how we successfully managed to operate during its initial stage.

1. Introduction

The Belle II experiment [1] at the SuperKEKB [2] e^+e^- collider in KEK, Japan, started physics data-taking with a complete detector from early 2019. Belle II and SuperKEKB are the successors of Belle [3] and KEKB [4].

The target instantaneous luminosity of SuperKEKB is 40 times higher, and the target integrated luminosity is 50 times higher than its predecessor (Table 1). The Belle II detector is designed to cope with

the increase of the event rate as well as the harsh beam background at the target luminosity. Likewise, the trigger system has been upgraded to have robustness and flexibility, and a corresponding slow control system has been prepared to ensure physics data-taking. We use a custom-developed software package for data acquisition and slow control. Especially, a custom-made network memory sharing technique is one of core technique of the package.

In this paper, we describe the trigger slow control system of the Belle II experiment. Section 2 briefly describes the Belle II detector

* Corresponding authors.

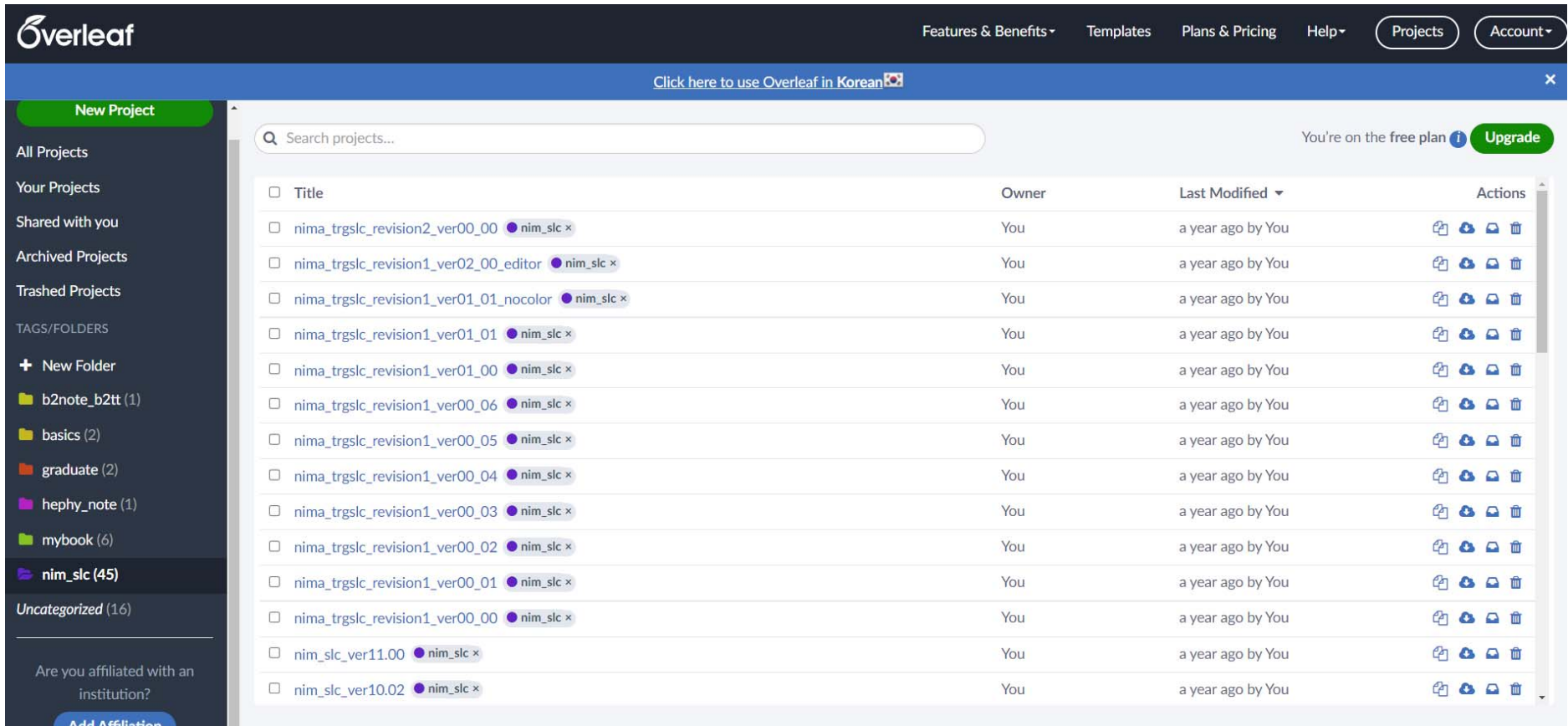
E-mail addresses: hun4341@hanyang.ac.kr (C.-H. Kim), bgcheon@hanyang.ac.kr (B.G. Cheon).<https://doi.org/10.1016/j.nima.2021.165748>

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
















Available online 17 August 2021

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<input type="checkbox"/> Title	Owner	Last Modified	Actions
<input type="checkbox"/> nima_trgslc_revision2_ver00_00 nim_slc x	You	a year ago by You	   
<input type="checkbox"/> nima_trgslc_revision1_ver02_00_editor nim_slc x	You	a year ago by You	   
<input type="checkbox"/> nima_trgslc_revision1_ver01_01_nocolor nim_slc x	You	a year ago by You	   
<input type="checkbox"/> nima_trgslc_revision1_ver01_01 nim_slc x	You	a year ago by You	   
<input type="checkbox"/> nima_trgslc_revision1_ver01_00 nim_slc x	You	a year ago by You	   
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- a05_b2experiment.tex
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- a07_trgslc_imp.tex
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- a10_summary.tex
- a11_acknowledgement.tex
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- f02_rc_diagram.jpg
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- f08_L1_trgRate.jpg
- f09_trgddl_detail_main.jpg
- f10_ecltrc_noise.png

File outline

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4 \import{.}{a01_setting}
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7
8 \begin{frontmatter}
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10  \import{.}{a02_authors}
11  \import{.}{a03_abstract}
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13    slow control system \sep
14    Trigger \sep
15    Data acquisition
16  \end{keyword}
17 \end{frontmatter}
18
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20 %%% Main text
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22 \import{.}{a05_b2experiment}
23 \import{.}{a06_trgslc_framework}
24 \import{.}{a07_trgslc_imp}
25 \import{.}{a08_panels}
26 \import{.}{a09_operation}
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30 \import{.}{a11_acknowledgement}
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35 \end{thebibliography}
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37 \end{document}

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Trigger slow control system of the Belle II experiment

C.-H. Kim^{a*}, Y. Unno^a, H. E. Cho^a, B. G. Cheon^{b*}, S. H. Kim^{b*}, I. S. Lee^{b*}, E.-J. Jang^c, S.-K. Choi^c, Y. J. Kim^d, J. K. Ahn^d, M. Remnev^{e,f}, A. Kuzmin^{e,f}, T. Koga^g, Y.-T. Lai^g, Y. Iwasaki^g, H. Nakazawa^g, D. Liventsev^{h,g}, M. Nakao^{h,i}, S. Yamada^h, R. Itoh^h, T. Konno^h, S.-H. Park^{h,j}, Y.-J. Kwon^h, O. Hartrich^{k,m}, M. Ritzert^k

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^eBudker Institute of Nuclear Physics SB RAS, Novosibirsk 630090, Russian Federation
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^kKiushu University, Supomocho 252-0373
^lYonsei University, Seoul 03722
^mUniversity of Hawaii, Honolulu, Hawaii 96822
ⁿUniversity of Heidelberg, 68131 Mannheim

Abstract

The Belle II experiment at the SuperKEKB e^+e^- collider in KEK, Japan, started physics data-taking with a complete detector from early 2019. An online trigger system is indispensable for the Belle II experiment to reduce the beam background events associated with high electron and positron beam currents without sacrificing the target physics-oriented events. During the Belle II operation upon beam collision, the trigger system must be consistently controlled and its status must be carefully monitored in the process of data acquisition against unexpected situations. For this purpose, we have developed a slow control system for the newly developed Belle II trigger system based on the custom-made Belle II DMQ / slow control package. Around seventy thousand configuration parameters are saved in the Belle II central database server for every run when a run starts and stops. These parameters play an essential role in offline validation of the quality of runs. Around three thousand real-time variables are stored in the Belle II main archiving server, and the trend of some of these variables are regularly used for online and offline monitoring purposes. Various operator interface tools have been prepared and used. When the configuration parameters are not correctly applied, or some of the processes are unexpectedly terminated, the slow control system detects it, stops the data-taking process, and generates an alarm. In this article, we report how we constructed the Belle II trigger slow control system, and how we successfully managed to operate during its initial stage.

Keywords: Slow Control System, Trigger, Data acquisition

1. Introduction

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The target instantaneous luminosity of SuperKEKB is 40 times higher, and the target integrated luminosity is 50 times higher than its predecessor (Table 1). The Belle II detector is designed to cope with the increase of the event rate as well


trol. Especially, a custom-made network memory sharing technique is one of core technique of the package.


Table 1
The KEKB/Belle achieved and the SuperKEKB/Belle II target luminosities.


	Instantaneous (10^{34} cm ⁻² s ⁻¹)	Integrated (ab ⁻¹)
KEKB/Belle	2.1	1.0
SuperKEKB/Belle II	80	50


Tools: Grammary


PREMIUM



grammarly


My Grammarly


Trash NEW


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Apps



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×

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chkim.hanyang@gmail.com

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New

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SLC draft

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E-mail

What software version is used for the reconstruction code?

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efficiency uncertainty,

efficiency uncertainty, error matrix, chi-squared statistics in higher dimension, goodness of fit,

Upload
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Dear Dmitri, The draft

Dear Dmitri, The draft is not submitted yet... Attached draft is the latest version. Sorry for the late response. Best

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I'm not able to cope with the stresses and strains of writing the draft.

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Dear Oskar, Many thanks

Dear Oskar, Many thanks for your impressive comments. I can open the comment-applied version of the

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Study of Slow Control System Performance for the Belle II Trigger System CheolHun Kim*1, SungHyun Kim1, InSoo Lee1,

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[190227 작성 시 작]

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Slow Control Package for the Trigger System at the Belle II experiment CheolHun

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[190227 작성 시 작]

abstract_201904_

Slow Control Package for the Trigger System at the Belle II experiment CheolHun


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Demo document

Remember when you were a careles eight year old kid riding a bike with your friends,racing each other around the

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Jul.15.2022 ECLTRG Student Meeting, Cheolhun Kim



9 / 19

Belle II note

Trigger slow control system of the Belle II experiment

[Cheolhun Kim](#) ; [Yuuji Unno](#) ; [Haneol Cho](#) ; [ByungGu Cheon](#) ; [Sunghyun Kim](#) ; [Insoo Lee](#) ; [Eunji Jang](#) ; [SooKyung Choi](#) ; [YoungJun Kim](#) ; [Jung Keun Ahn](#) ; [Mikhail Remnev](#) ; [Alexander Kuzmin](#) ; [Taichiro Koga](#) ; [Yun-Tsung Lai](#) ; [Yoshihito Iwasaki](#) ; [Hideyuki Nakazawa](#) ; [Dmitri Liventsev](#) ; [Mikihiko Nakao](#) ; [Satoru Yamada](#) ; [Ryosuke Itoh](#) ; [Tomoyuki Konno](#) ; [Seokhee Park](#) ; [Youngjoon Kwon](#) ; [Oskar Hartbrich](#) ; [Michael Ritzert](#)

10 May 2021

Abstract: The Belle II experiment at the SuperKEKB e^+e^- collider in KEK, Japan, started physics data-taking with a complete detector from early 2019 with the primary physics goal of probing new physics in heavy quark and lepton decays. An online trigger system is indispensable for the Belle II experiment to reduce the beam background events associated with high electron and positron beam currents without sacrificing the target physics-oriented events. During the Belle II operation upon beam collision, the trigger system must be consistently controlled and its status must be carefully monitored in the process of data acquisition against unexpected situations. For this purpose, we have developed a slow control system for the Belle II trigger system. Around seventy thousand configuration parameters are saved in the Belle II central database server for every run when a run starts and stops. These parameters play an essential role in offline validation of the quality of runs. Around three thousand real-time variables are stored in the Belle II main archiving server, and the trend of some of these variables are regularly used for online and offline monitoring purposes. Various operator interface tools have been prepared and used. When the configuration parameters are not correctly applied, or some of the processes are unexpectedly terminated, the slow control system detects it, stops the data-taking process, and generates an alarm. In this article, we report how we constructed the Belle II trigger slow control system, and how we successfully managed to operate during its initial stage.

Keyword(s): [Slow Control System](#) ; [Trigger](#) ; [Data acquisition](#)

The record appears in these collections:

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Record created 2021-05-10, last modified 2021-08-12

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Accepted

Your Submission 외부 NIMA_trgslc x


Peter Krizan <em@editorialmanager.com>

2021년 8월 13일 (금) 오후 10:40



나에게 ▾

ㄸA 영어 ▾ > 한국어 ▾ 메일 번역

영어 번역 안함 x

Ms. Ref. No.: NIMA-D-21-00140R2

Title: Trigger slow control system of the Belle II experiment

Nuclear Inst. and Methods in Physics Research, A

Dear Mr. Kim,

I am pleased to confirm that your paper "Trigger slow control system of the Belle II experiment" has been accepted for publication in Nuclear Inst. and Methods in Physics Research, A.

Your accepted manuscript will now be transferred to our production department and work will begin on creation of the proof. If we need any additional information to create the proof, we will let you know. If not, you will be contacted again in the next few days with a request to approve the proof and to complete a number of online forms that are required for publication.

Comments from the Editor and Reviewers, if any, can be found below.

Thank you for submitting your manuscript to our journal.

With kind regards,

Peter Krizan, Dr.

Editor

Nuclear Inst. and Methods in Physics Research, A

Comments from the Editors and Reviewers:

Congratulation Messages

Trigger slow control paper is accepted by NIMA

3_HEP 연구실 x

trgslc_paper_NIMA x



Cheolhun Kim <chkim.hanyang@gmail.com>

2021년 8월 14일 (토) 오후 3:56



Yuuji, 조한얼, 천병구, Kim, 이인수, 장은지, SooKyung, rladudwns118, \ahnjk@korea.ac.kr\, Mikhail, Alexander, Taichiro, Yun-Tsung, 岩崎, Hide, D

Dear authors,

I'm pleased to inform you that our paper:

"Trigger slow control system of the Belle II experiment"

C. -H. et al.,

has been accepted for publication by NIM A (Nuclear Instruments and Methods in Physics Research Section A) journal.

Thank you sincerely for your contribution and help.

Best regards,
Cheolhun Kim



Mikihiko Nakao <mikihiko.nakao@kek.jp>

나에게 ▾

2021. 8. 14. 오후 4:15



🗨️ 영어 ▾ > 한국어 ▾ 메일 번역

영어 번역 안함 ×

Congratulations! Good work!

cheers,



Mikihiko Nakao - KEK (High Energy Accelerator Research Organization)
IPNS (Institute of Particle and Nuclear Studies)



Yuuji Unno <yunno@post.kek.jp>

천병구, Yuuji, 나에게 ▾

2021. 8. 15. 오전 3:50



🗨️ 영어 ▾ > 한국어 ▾ 메일 번역

영어 번역 안함 ×

Dear Cheolhun,

Congratulation!

It's done, so you can relax.

But, please be careful for corona since I heard # of infected case
in Korea is largest in Koera recently (Japan too!)

best regards

Y.Unno





岩崎 義仁 <yoshihito.iwasaki@kek.jp>
나에게 ▾

2021. 8. 17. 오후 2:25 ☆ ↶ ⋮

🗨 언어 감지 ▾ > 한국어 ▾ 메일 번역

영어 번역 안함 ✕

Congratulations!!!

> 2021/08/14 15:56, Cheolhun Kim <chkim.hanyang@gmail.com>의 메일:



Cheolhun Kim

2021. 8. 28. 오후 3:33 ☆

Dear authors, The final version of the paper "Trigger slow control system of the Belle II experiment" is published online. Link: <https://authors.elsevier.com/sd>



Koga Taichiro <iwakuma21@gmail.com>
나에게 ▾

2021년 8월 28일 (토) 오후 4:06 ☆ ↶ ⋮

🗨 영어 ▾ > 한국어 ▾ 메일 번역

영어 번역 안함 ✕

Congratulations !!

Best,
Koga

Award



자연과학연구소 학생논문상
우 수 상

논문제목 : Trigger solw control system of the belle II
experiment

성명 : 김철훈
전공 : 물리학 전공
과정 : 석. 박사통합과정

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소장 송 정 환



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Backup



Cheolhun Kim <chkim.hanyang@gmail.com>

Mikhail, Alexander, 천병구에게 ▾

2021년 1월 26일 (화) 오후 5:38



Dear Mikhail,

I hope you are having a great day.

I've prepared a trigger slow control draft, soon to be submitted on NIMA journal.

I got a lot of help from you when I develop the trigger slow control system, so I would like to include your name on the author list if you don't mind.

Thank you.

Best regards,

Cheolhun Kim



Mikhail Remnev <mikhail.a.remnev@gmail.com>

나, Alexander, 천병구에게 ▾

2021년 1월 26일 (화) 오후 7:24



🗨️ 영어 ▾ > 한국어 ▾ 메일 번역

영어 번역 안함 ✕

Dear Cheolhun,

Thank you! I definitely don't mind.