Responding to the First Wave of COVID-19 and Preparing for the Second Wave

1 Introduction

Japan has made it through the first wave of COVID-19 (official name), commonly known as the novel coronavirus, if we look at the number of infected people alone. However, “the pandemic is still accelerating” globally today (words of WHO chief Tedros Adhanom Ghebreyesus, June 19, 2020). In the US, which has the largest number of confirmed cases, already surpassing approximately 45,000 cases a day, the case numbers are increasing with the reopening of economy. It has also been predicted that the second wave will be larger than the first in Japan as well, and we are expecting more than ever that the uncertain times will continue for a long period.

In this article, also summarizing how we are preparing for the second wave that we are expecting, we will summarize our current situation by looking back on how the IIMC, who organize the information environment of Kyoto University, handled this situation by focusing on online classes.

2 How we responded to the first wave

The way we responded to the first wave of COVID-19 can be largely divided into the initial response period (early March to April 6), the preparation period (April 7 to May 1), and the full-scale response period (May 2 onward).

2.1 Initial response period (early March to April 6)

First, during the initial response period, with PandA being a core system of our online classes, we took measures against PandA overload (enhancing computational resources such as virtual machines). The goal was to prevent PandA from collapsing due to the rapid increase in PandA users. We held seven online training sessions to aid users (the PandA 101 site created for the seminar had approximately 1,900 participants). We also started preparing for online classes, assuming that Zoom will be used as it is a remote conference system that can also be used for large lectures. Helping us to obtain a license (20 host licenses) for educational institutions and respond quickly to the expansion of free licenses and the acquisition and transfer of volume license for the entire university through our negotiations with Zoom Video Communications, Inc., we have been working on requesting a rough estimate for AY2021, as we have been considering Zoom as the core of our next high-resolution distance learning system since last fall. During this period, we held a total of five training sessions (approximately 3,140 people participated). Through the IMS LTI (Learning Tool Interoperability) standards, we are also able to provide attendees with easy access to the lectures from the PandA course site created for each course, without notifying meeting ID and passwords to them.

We also have been cooperating with Center for the Promotion of Excellence in Higher Education since March 23. From early on, we started the project with strong cooperation in the provision of various support for online classes, such as launching the website “Teaching Online@Kyoto U” (see the Fig. 1) and co-hosting a lecture, creating a system in which the center provides support from the view point of didactics and the institution provided support from the view point of information technology.

Figure 1: Teaching Online@Kyoto U (https:www.highedu.kyoto-u.ac.jp/connect/teachingonline/)

2.2 Preparation period (April 7 to May 1)

While it was announced that classes for the common courses are cancelled until May 6, some departments and graduate schools held lectures for specialized subjects mostly as scheduled. The first PandA collapse crisis occurred on April 8. IIMC introduced Slack three years ago as a tool to communicate in real time. We also have a dedicated channel on Slack for sharing information on COVID-19 response. When we look back at the messages on Slack, the measures against overload were taken as planned on April 8. However, the number of concurrent users exceeded an all-time high of 4,200 users and the CPU occupancy of backend database remained at 100% for a few minutes, which is a situation we feared the most. We used Slack to share updates on these situations as they changed moment by moment.

However, the spread of COVID-19 gradually worsened, and the Prime Minister declared a state of emergency across Japan on April 16. On fear that PandA may crash due to the online classes starting the following week, we immediately co-planned an online demo class targeted toward new undergraduate students with the Institute of Liberal Arts and Sciences. This was held in the 5th period on April 21. With students having no issues carrying out tasks which increase the load on the system, such as downloading and viewing class materials, answering surveys, taking online tests and submitting assignments, as instructed by professors, approximately 2,100 new students participated and the number of concurrent users, including current students, climbed to a record high of approximately 8,300 students. As a result, we have the prospect of being able to handle approximately 11,000 people consisting of 10,500 students plus 300 instructors on the second period of Tuesday when the maximum number of users will be expected (based on the last year's results).

With the spread of Zoom use, the amount of recorded data of Zoom transferred from PandA to Kaltura, a cloud-based video platform that can be used along with LTI, as well as the number of times the videos are rewatched have started to increase.

2.3 Full response period (May 2 onward)

We conducted an urgent maintenance of the backend Oracle database server (enhancement from 8 cores to 12 cores) on May 2 in order to respond to the increasing number of users. Afterward, and with the CPU occupancy rate exceeding 100% for approximately 55 minutes due to the database server processing reaching its limit, thinking we would be able to handle the situation with no issues, but unfortunately, the number of users exceeded 14,000 people when the third period started, we recorded the highest number of users yet at 13,200 people during the first and second period on May 7 after the holiday, despite experiencing unexplained occurrence of delay in backup processing, tuning processing, and data deletion processing.

As an urgent response, although we found out that the issues we had after the holiday were a matter of READ performance of Fujitsu's file server, we enlarged the database server capacity to 1.5 times its original size. As a result, we have not had another overload that could cause PandA to collapse to this date. We have been operating under a temporary measure in the two months since.

3 Current situation

The usage of PandA, Zoom, and Kaltura, which are the three main services of online classes provided by IIMC, have drastically changed in about three months. Figure 2 summarizes the relationship with KULASIS, which is used as a system for educational administration (e.g., registering to courses, checking grades).

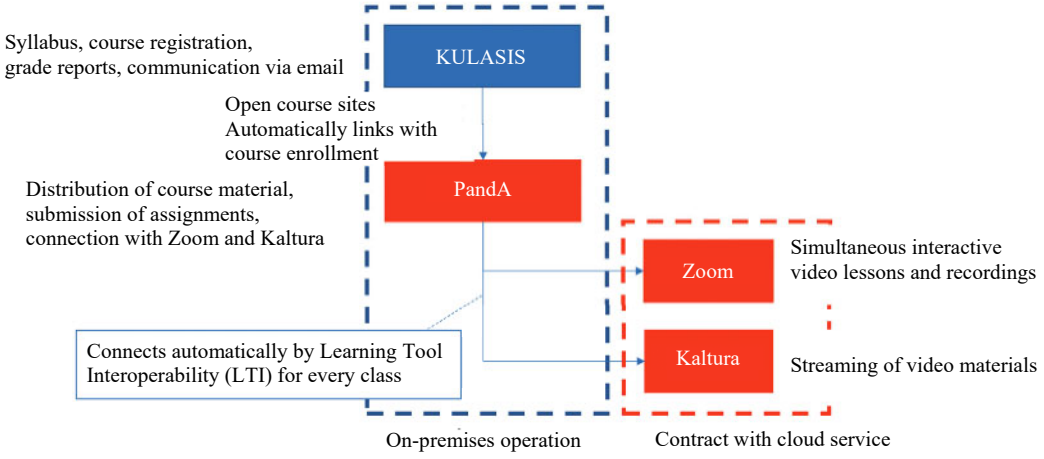


Figure 2: Response to implementation of online classes

First, 5,903 courses opened a course site on PandA in the first half of the school year alone. This is much more than the 1,740 courses of last year (see Fig. 3). If you look at each department that has opened course sites, while you can see that usage for specialized courses has grown in the past year, the sites created by the Institute for Liberal Arts and Sciences, which provides common courses, accounted for approximately half of the course sites until last year.

Lists of courses using PandA course in the AY2020

7/1/2020

Number of sites opened

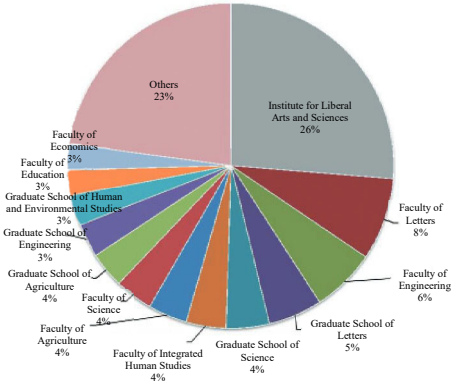
		Number of participating departments	Total number of courses	Number of sites opened
AY2013		22	10,319	86
AY2014		26	12,814	482
AY2015		28	13,409	663
AY2016		29	15,106	824
AY2017		30	14,775	1,015
AY2018		30	14,710	1,570
AY2019		30	14,817	1,740
AY2020	First semester	32	14,850	5,903
	Second semester			

Number of participating departments: departments providing information about courses in PandA; cumulative value within the same year

Number of registered users

	PandA opening	KULASIS registration	Usage rate
Student	17,586	19,658	89%
Instructor	2,819	3,346	84%

PandA opening: total number of people registered to course sites opened on PandA
KULASIS registration: total number of people who are registered to course information on KULASAS as instructor or student



Number of course sites opened by departments

Department name	Number of sites	Number of courses	Sites opening rate	Sites opening rate: Full year	Sites opening rate: First semester	Sites opening rate: Second semester	Sites opening rate: Others	Total number of courses (estimate): Full year	Total number of courses (estimate): First semester	Total number of courses (estimate): Second semester	Total number of courses (estimate): Others
Institute for Liberal Arts and Sciences	1552	2,993	51.9%	61%	95%	6%	40%	11	1463	1331	185
Languages	526	1126	46.7%	89%	90%	3%	39%	9	543	546	28
Natural Sciences	372	658	56.5%		99%	11%	29%	0	336	308	14
Seminars in Liberal Arts and Sciences	214	265	80.8%		96%	0%	50%	0	204	22	38
Informatics	55	91	60.4%		100%	10%		0	51	40	0
Humanities and Social Sciences	242	524	46.2%		97%	5%	30%	0	229	272	23
Interdisciplinary Sciences	19	38	50.0%		100%	25%	33%	0	13	20	3
Health and Sports	24	93	25.8%		100%	2%	14%	0	22	64	7
Career Development	39	71	54.9%	100%	100%	0%	25%	2	35	26	8
Common Graduate Course	16	30	53.3%		100%	0%	33%	0	6	5	19
Interdisciplinary Graduate Course	45	97	46.4%		92%	14%	42%	0	24	28	45
Undergraduate: Faculty of Letters	483	975	49.5%	94%	86%	11%	22%	82	399	407	87
Undergraduate: Faculty of Education	151	267	56.6%	90%	93%	14%	32%	29	107	100	31
Undergraduate: Faculty of Law	102	156	65.4%	100%	100%	30%	50%	1	77	76	2
Undergraduate: Faculty of Economics	151	381	39.6%	100%	78%	7%	100%	1	178	200	2
Undergraduate: Faculty of Science	223	478	46.7%	49%	99%	15%	23%	69	142	157	110
Undergraduate: Faculty of Medicine	43	43	100.0%	100%				43			
Undergraduate: Faculty of Medicine (Human Health Science)	109	198	55.1%	75%	91%	14%	38%	8	35	42	113
Undergraduate: Faculty of Pharmaceutical Sciences	64	167	38.3%	25%	88%	2%	43%	57	52	51	7
Undergraduate: Faculty of Engineering	376	633	59.4%		99%	21%	14%	0	315	268	50
Undergraduate: Faculty of Agriculture	229	393	58.3%	55%	97%	25%	56%	40	141	158	54
Undergraduate: Faculty of Integrated Human Studies	234	511	45.8%	63%	95%	4%	11%	8	222	170	111
Graduate schools, etc.: Graduate School of Letters	317	749	42.3%	75%	75%	10%	19%	58	298	304	89
Graduate schools, etc.: Graduate School of Education	112	218	51.4%	75%	87%	21%	24%	15	86	80	37
Graduate schools, etc.: Graduate School of Law	121	174	69.5%	96%	88%	22%	67%	52	65	54	3
Graduate schools, etc.: Graduate School of Economics	79	187	42.2%	0%	88%	6%	13%	4	81	79	23
Graduate schools, etc.: Graduate School of Science	253	1,204	21.0%	0%	39%	5%	15%	2	541	551	110
Graduate schools, etc.: Graduate School of Medicine	105	224	46.9%		95%	23%	45%	0	21	30	173
Graduate schools, etc.: Graduate School of Medicine (Graduate course, Human Health Science)	107	395	27.1%	21%	46%	11%	50%	127	141	123	4
Graduate schools, etc.: Graduate School of Pharmaceutical Sciences	15	142	10.6%				11%	0	0	0	142
Graduate schools, etc.: Graduate School of Engineering	201	643	31.3%	0%	86%	13%	8%	1	182	181	279
Graduate schools, etc.: Graduate School of Agriculture	210	601	34.9%	32%	79%	10%	43%	393	48	62	98
Graduate schools, etc.: Graduate School of Human and Environmental Studies	173	1,411	12.3%	4%	40%	2%	13%	711	350	332	16
Graduate schools, etc.: Graduate School of Energy Science	63	159	39.6%		95%	8%	8%	0	58	36	65
Graduate schools, etc.: Graduate School of Asian and African Area Studies (ASAFAS)	53	126	42.1%		79%	15%	3%	0	58	39	31
Graduate schools, etc.: Graduate School of Informatics	52	212	24.5%	4%	78%	6%	8%	45	55	62	50
Graduate schools, etc.: Graduate School of Biostudies	20	391	5.1%	100%	100%	0%	4%	1	2	2	386
Graduate schools, etc.: Graduate School of Global Environmental Studies (GSGES)	45	136	33.1%		100%	0%	27%	0	11	4	125
Graduate schools, etc.: School of Government	51	114	44.7%		96%	8%	0%	0	49	50	15
Graduate schools, etc.: Graduate School of Management (GSM-KU)	91	310	29.4%		56%	4%	36%		143	155	14
Graduate schools, etc.: Graduate School of Law	88	187	47.1%	100%	90%	6%		2	89	96	0
Graduate schools, etc.: Graduate School of Advanced Integrated Studies in Human Survivability (Shishu-kan)	30	72	41.7%	31%	81%	11%	0%	16	27	28	1
								1776	5436	5228	2413

*The Faculty of Medicine created sites for necessary courses at the beginning of the year.

Figure 3: Status of PandA course sites (as of July 1, 2020)

Approximately 1,500 Zoom meetings are held per day and the number of users have grown to approximately 30,000 users per day (see Fig. 4). Many are class attendees that access Zoom via PandA, but a number of small-scale meetings have also been hosted.

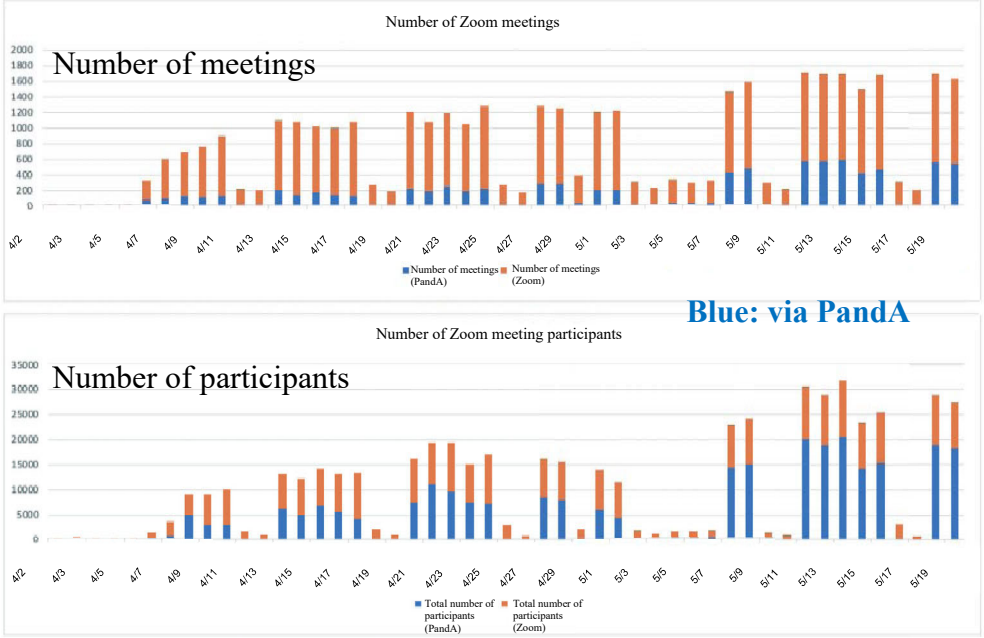


Figure 4: Zoom usage status (4/1–5/19)

Furthermore, approximately 5,444 hours of video and audio have been recorded and viewed on Kaltura through its use since April (see Fig. 5). The storage capacity is 4.5 TB. If we combine the network bandwidth usage associated with viewing, it will amount to 36.4 TB.

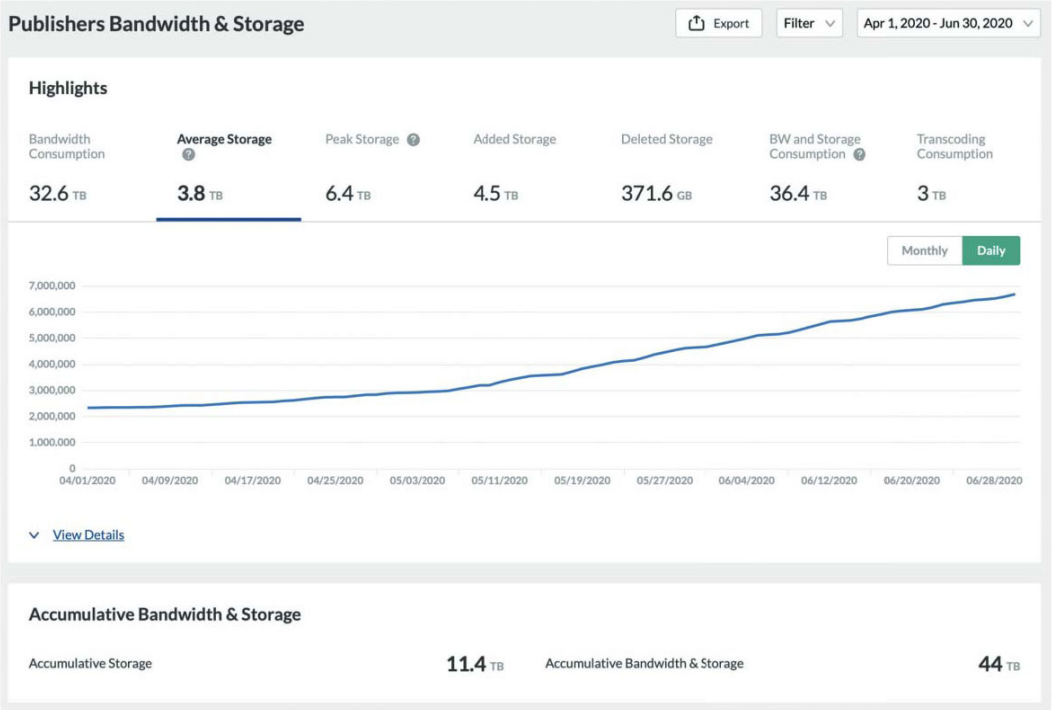


Figure 5: Kaltura usage (April 1–June 30)

Through conducting all classes online in this way, Kyoto University's educational and learning activities are being accumulated in PandA, Zoom, and Kaltura.

Additionally, preparation for online exams has begun as the first half of the school year nears its end. On June 30, we jointly hosted the "Seminar for Your First Online Exam with PandA" with Center for the Promotion of Excellence in Higher Education, and approximately 280 people participated.

4 Preparations for the second wave

Based on what we discussed above, we recognized the challenges in preparing for the second wave expected in the future.

First, we came up with several ideas to avoid a situation that would lead to "PandA collapse," our biggest concern, with regard to PandA which operates on-premises using processor resources of the general-purpose computer system. However, we still have the issue caused by Fujitsu's file server. Further operation stability measures will be required. Additionally, measures for greater ease of use, such as improving PandA's function and user interface as well as resolving chaos caused by function that overlap with KULASIS, need to be enhanced as well.

Also, regarding Kaltura, which we have a cloud service contract with, we have applied for budgetary approval to gain unlimited storage capacity and unlimited network download bandwidth, where we may exceed the annual contract capacity within the year if current use trends continue.

Zoom is also a cloud service, but the security issues that were largely highlighted earlier in its implementation are heading toward resolution. At least for this year, we will maintain our status quo with Zoom.

In any case, the three core services in conducting all classes online during the second wave will be PandA, Zoom, and Kaltura. Therefore, IIMC will make efforts toward a more secure operation and improved use. We would appreciate your candid opinions.

(Shoji Kajita, Professor of the IT Planning Office, IIMC)

Let's use Google Meet and Google Chat!

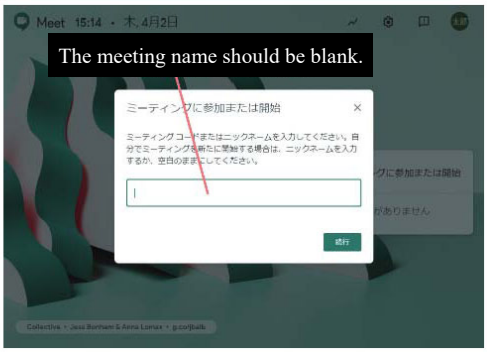
This year, there have been more opportunities to go about the daily business from home due to the coronavirus. We imagine that many of you are utilizing video conference call such as Zoom and Skype to communicate with others remotely.

As an alternative tool that can be used when these services become unavailable due connectivity issues, etc., we introduced Google Meet into Kyoto University's faculty & staff groupware (G Suite) in April 2020. You can also use Google Chat for group chat.

However, depending on how you use these apps, there are risks of accidents such as information leaks. Therefore, we will introduce matters to note in order to use them safely.

*This article is based on information available as of July 1, 2020.
For the latest information, please refer to faculty & staff groupware manual or Google help.

1. Google Meet



Google Meet is an app in which you can have a video conference with one or more people. By not using a meeting name, you can have a video conference only with users that know the meeting URL. Any users with a Kyoto University domain (@kyoto-u.ac.jp) who knows the URL can join. There is no function for limiting participation to specific users, so please be extra careful when sending the URL.

For more information on how to use Google Meet, please refer to below.

1. Access Google Meet (https://meet.google.com/).
2. Click "Join or Start a meeting."
3. Leave the meeting name blank and click "Continue".
4. Adjust the camera and microphone settings (on/off) and click "Join now."
5. Invite members by adding users or sharing the URL.

Reference: Google Meet Help
https://support.google.com/meet/

Things to be aware of

- About requests to join a meeting

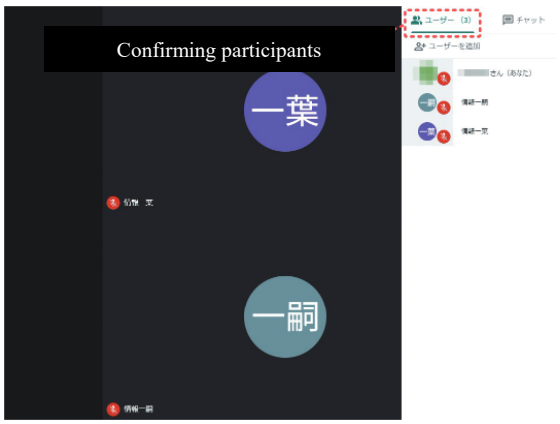
  When users outside of Kyoto University's domain (individual's Gmail account [@gmail.com], other G Suite accounts such as users unique to departments, or users without accounts) accesses a meeting, a request will appear. Please be careful of imposters. Approve the request after confirming that it was made by the meeting participant.

- About using a meeting name

  When you use a meeting name, a user who does not know the URL can join the meeting by entering the meeting name. In order to prevent unauthorized users from joining, please do not use a meeting name.

- Confirming participants of a meeting

  Users who do not have a Kyoto University domain cannot join unless approved, but any user with the domain can join without approval as long as they know the meeting URL. When you are handling highly confidential information, please make sure that unauthorized users are not participating.



- About Google accounts of participants

  If an approval is required even if you are a Kyoto University domain user, there is high possibility that you are logged in to Google with an account other than the domain in the browser you are using (individual Gmail accounts [@gmail.com] or other G Suite accounts such as users unique to the departments). Access the meeting URL while you are logged in with Kyoto University domain (@kyoto-u.ac.jp).

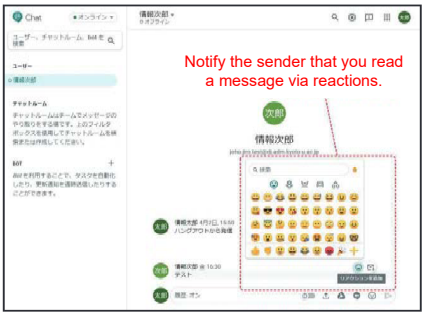
  Reference: Kyoto University's IIMC Magazine "Info!" No.17

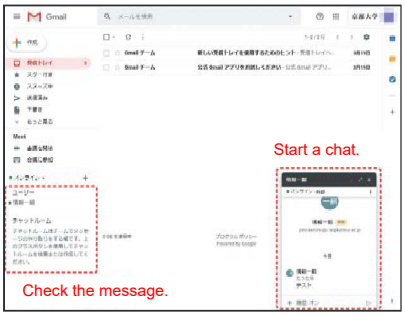
  [Tips] Switching between university and personal Google accounts

2. Google Chat

Being a useful tool for simple communication that doesn't merit email or video conference, Google Chat is an app in which you can chat with one or more people. It's even more convenient when you also use the app available on iOS or Android.

When you receive a message from other users, a notification will appear on the left-hand side of the Gmail page. If you click it, you can start a chat. You can also notify the sender that you saw the message by sending reactions.





For more information on how to use Google Chat, please refer to below.

1. Access Google Chat (https://chat.google.com/).
2. Search users and chat rooms from the search window on the top left of the screen.
3. Send a message on the chat screen on the right.
4. You can send reactions by putting the cursor over the message.

Reference: Google Chat Help
https://support.google.com/chat/

Things to be aware of:

Sometimes it is hard to notice you received a message on Google Chat, so please change the notification setting to the following.

- Set notifications to ON (PC and smartphone).
- Leave the chat screen open on the browser (notification will be displayed on the browser tab when you receive a message).

Reference: Google Chat Help—Turn Chat notifications on or off
https://support.google.com/chat/answer/7655718

3. Google Hangout

In Kyoto University's G Suite service, you can use Google Hangouts, but this app is scheduled to end in late 2020. The function will be integrated into Google Meet and Google Chat.

Although you must please avoid using it as much as possible, currently, the Google Hangout icon is displayed in the Kyoto University G Suite app menu.

4. Manual

For manuals on the faculty & staff groupware, please see below.

- Faculty&staff groupware manual
  Faculty&staff groupware > Links > Manuals, FAQs, Contact > faculty&staff groupware manual

(Yuki Narita, Business System Management Team, Information Infrastructure Division,
IT Planning Office/Planning and Information Management Department, IIMC)

Service introduction

Commencement of the provision of WEB Hosting service (type S)

We started providing the WEB Hosting service (type S) using a private cloud service (Sakura's rental server) in April 2020.

The WEB Hosting service will enable you to set up a website without the need to build or operate a server, which can be troublesome.

We have been offering an on-premises environment WEB Hosting service (type K) using Kyoto University's server. However, by using a cloud service, you will be able to run a more stable website. Capacity of publishing space has expanded vastly, and operation of multiple domains with one contract is now possible.

Type S has the following three plans (standard, business and managed). Please feel free to use the service.

Subscription fee

The service we are providing and the subscription fees are as follows:

Classification	Subscription fee	Description
WEB Hosting service (type S; standard)	9,000 yen per year	Capacity of publishing space100 GB Number of multi-domains100 Estimated maximum transfer rate80 GB per day (*) Number of DB: 20, capacity: 1.5 GB Shared server
WEB Hosting service (type S; business)	36,000 yen per year	Capacity of publishing space300 GB Number of multi-domains200 Estimated maximum transfer rate160 GB per day (*) Number of DB: 100, capacity: 6 GB Shared server Can have multiple administrators
WEB Hosting service (type S; managed)	180,000 yen per year	Capacity of publishing space700 GB Unlimited multi-domains Estimated maximum transfer rate200 GB per day (*) Number of DB: unlimited Dedicated server Can have multiple administrators

*While when the demand for data transfer increases rapidly and pressures shared lines, a similar error response code may be returned, when the amount of access greatly exceeds the maximum bandwidth, the page or resource will be unavailable due to errors such as "503 Service Temporarily Unavailable."

Merits for using WEB Hosting service of IIMC

Although it is possible to contract directly with private businesses such as Sakura Internet Inc., using services that the IIMC provides offer the following advantages:

- Immediately available with no additional paperwork required to contract with a private business (an account will be issued in approximately three days after the service application);
- Consultation with and support from the IIMC regarding use;
- Vulnerability diagnosis carried out by IIMC (preparation in progress).

We are considering providing backups for BCP and virus scans in the future.

Cautions when using type S:

When you begin using type S, you will need a DNS registration. However, with type S, you cannot register a host name to KUINS-DB because Sakura Internet Inc.'s IP address will be used.

To register to the DNS, you will need to submit a request to the department's domain administrator.

Request for transfer to type S for pre-2019 web hosting service users

The previous on-premises WEB Hosting service (name: type K) will end its services and shut down its server in August 2021. We ask type K users to transfer to type S (acceptance of new requests ended at the end of March 2020). Transfer notifications will be sent to users in June 2020. Please check the notification and take the necessary steps.

Using Google Sites

Google Sites has been available for tenants of G Suite, which Kyoto University is subscribed to, since June 2020. Please check the following precautions and consider using the service if suits your needs, with Google Sites being free to use and can be used immediately with safety.

We recommend Google Sites for temporary websites and the WEB Hosting service for permanent websites.

Cautions when using Google Sites:

- The URL that can be specified will be https://sites.google.com/kyoto-u.ac.jp/your-texts-here; You cannot specify your own domain such as the domain of a department;
- The site data will be deleted when the site owner (creator) resigns; If you want to continue using the site, you will need to change the site owner before they resign.

Reference:

- WEB Hosting service (type S)
  - Application Process: https://u.kyoto-u.jp/whsreq
  - A manual for new users: https://u.kyoto-u.jp/whsriyou
  - FAQs: https://u.kyoto-u.jp/whsfaq
- Basic specifications of Sakura's rental server: https://help.sakura.ad.jp/206053142/
- Manual for Google Sites: Google サイトマニュアル:　教職員ポータル⇒マニュアル・FAQ⇒教職員グループウェアマニュアル⇒操作マニュアル「マニュアル_25_Google ドライブ等の GSuite コアサービス」

(Hirofumi Sawada, Head of Cloud Computing Group, Information Infrastructure Division,
IT Planning Office/Planning and Information Management Department, IIMC)

Editorial

A Serious Threat! Information Leakage from Loss and Theft

In Japan, a state of emergency was declared in order to prevent the spread of the novel coronavirus (COVID-19). Remote work was encouraged at Kyoto University as well due to this situation. With the most important of these being the measures against information leakage, the University has announced some important items to note regarding information security measures, along with notifications from the human resources department. I am addressing this matter once again as the topic of this article.

According to the preliminary results of a survey on of information security incidents (2018) conducted by NPO Japan Network Security Association, the two most common causes of information leakage is loss/misplacement (26.2%) and misuse (24.6%). Incidents caused by human error make up more than half of the cases. Five cases of information leakage caused by data loss have occurred at Kyoto University since the end of last year.

The concerning thing about human error is that we often consider it to be a problem of the individual who made the mistake, and those of us who are not involved neglect to take measures, thinking “I will be okay because I am always careful.” Everyone makes mistakes, so we need to take measures with the understanding that we, too, may make a mistake.

So, let’s think about countermeasures against information leakage together.

Step 1. Do not carry data around.

If you do not carry data around, there is no risk of information leaking from a loss, for example. Store necessary data on an online server and be mindful not to save data on the PC that you carry around. If you have to work at a place with bad internet connection, make it your habit to delete information as soon as it becomes unnecessary, keeping information saved on your PC to a bare minimum.

Step 2. Lock with a password.

Lock the PCs that you carry around with a password, and make sure that people who do not know the password cannot operate it. Making sure it requires a password when resuming from the said mode, adjust the settings of your PC so that it will switch to sleep or screen saver mode when you do not use it for a certain amount of time.

Step 3. Encrypt.

Encrypting each file is effective, but consider encrypting the whole disk as a measure against loss and theft of PCs, USB flash drives, and external HDD. BitLocker is installed on Windows 8.1, 10 (Pro/Enterprise) and FileVault on MacOS as standard features, which are disk encryption software. Please utilize them.

The truly concerning thing about information leakage is human error. Overconfidence is our greatest enemy. Please take necessary precautions daily in case of emergency.

[Limited on-Campus] How to Prevent Information Leakage (Measures Against Loss and Theft, and How to Dispose of Information)

http://www.iimc.kyotou.ac.jp/ja/services/ismo/reference/prevent_information_leakage.html

Security Measures for Online Lectures and Meetings as Well as Working from Home

http://µwww.iimc.kyoto-u.ac.jp/ja/services/ismo/reference/remotework.html

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